REPORT

of

The Syllabus Committee

on the

Training of Rural Artisans

in the

Community Development Blocks

THE PRINCIPAL, RURAL EXTENSION TRAINING CENTRE, T. KALLUPATTI
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SYLLABUS FOR TRAINING OF RURAL ARTISANS IN WOODEN TOYS AND ALLIED CRAFTS (LACQUER WARES)

Theory	Practical
First Month	
(A) General information about timber suitable for making wooden toys and handicrafts—sources of supply of timber. Knowledge regarding common defects in timber such as cracks, knots, wet rot, dry rot, wood worms, twisted fibre and excess of water content and their effects on finished products.	(A) Practice in (*i*) grinding and sharpening of chisels, Hand saws, planes, drills. (*ii*) Sawing of wooden pieces at specific angles with hand operated saw. (*iii*) Shaping and surfacing of square and rectangular pieces to required Dimensions. (*iv*) Drilling of holes with hand operated drilling machine, Ratchet Brace and Auger. (*v*) Making of slots (square and rectangular) in wooden pieces.
(B) Lesson on elementary free hand drawings.	
(C) Description of manually operated carpenter tools.	
(D) Grinding and sharpening of chisels, Hand saws, planes, drills, Ratchet bits and Augers.	
(E) Lesson on fundamental manufacturing techniques employed in wooden toy making.	
Second Month	
(A) Making of drawings of rectangular, square and round wooden objects.	(A) Making of (*a*) Gluepaste (b) Material for filling cracks (*c*) French polish. Practice in filling of cracks with filling material prepared by mixing plaster of paris, wood saw dust and glue paste and smoothing of uneven surface with files and sand papers.
(B) Description of process of making : (*i*) Glue paste (*ii*) Material for filling cracks in wood (*iii*) French Polish.	(B) Practice in making common joints in wooden toys and handicrafts such as halves, mortise & tennon, scarf dovetail. Fixing of joints with glue paste.
(C) Lesson on various types of wooden joints.	(C) Stacking of wooden slabs for drying them by the process of natural seasoning.
(D) Lesson on simple process of seasoning of timber.	(D) Making of simple wooden objects such as rectangular trays, kerchief, necktie boxes, book shelves—their polishing with sand paper and french polish.
Third Month	
(A) Lesson on use of graph paper for making drawings of required dimensions. Use of templates and stencils for drawing outlines of toys on wood.	(A) Practice in making templates for wooden toys and their parts and cutting of stencils from plywood and metal sheet required for painting of wooden objects with spray painting equipment.
(B) Names and trade marks (*i*) Water and Oils Colours used for colouring of drawings and (*ii*) Coloured paints and lacquer required for painting of wooden toys. Making of drawings of birds, animals, human figures and their colouring by brush in water colours.	(B) Practice in making of wooden toys, birds, animals, human figures from flat wooden pieces with the help of hand operated and pedal operated Fretsaw machine.
C) Description of pedal operated Fret saw machine and its application in wood working industry.	

Theory	Practical
4th, 5th and 6th Month	
(A) Making of drawings of human figures, birds and animals and their colouring by brush in water colour.	(A) Practice in making and joining of parts to form complete toys such as Horses, Lions, Dogs, Elephants, Rabits, Deers, Sheep, Parrots and Duck.
(B) Description and use of electrically operated— (*i*) Round saw for sawing of wooden pieces (*ii*) Sand papering machine including portable type and (*iii*) Spray painting equipment complete with gun, air compressor, pressure gauge etc.	(B) Practice in use of bamboo dowels, Iron spikes and nails for joining parts of wooden toys.
	(C) Making of undercoat and its application on wooden objects. The undercoat material should be such that sticks properly on the wooden ob[illegible] and it will not split on drying practice in painting of wooden toys by brush and oil colour paints and with spray painting equipment.
(C) Description of various shapes of tools required for carving on wooden objects.	
7th Month	
(A) Making of drawings and sketches of round objects and colouring them in water colours.	(A) Practice in making wooden round objects such as wheels of wooden pramsans, fruit trays, wall plates, vegetable and soup bowls, flower vases.
(B) Description and use of different types of lathes employed in wood work Industry: (*i*) Bow operated. (*ii*) Pedal operated. (*iii*) Electrically operated. Description of tools required for turning, surfacing, thread cutting on wooden objects.	
8th and 9th Month	
(A) Description and use of electrically operated Fret-saw machine.	(A) Practice in making of moving wooden toys such as Aeroplanes, Trains Motor Cars, Carts, Trucks, animals on wheels, round powder boxes and educational toys.
(B Making of free hand drawings and sketches of moving wooden toys such as Aeroplanes, Trains, Motor Cars, Loco-Motives and colouring them in water colours.	(B) Practice in manufacture of Rocking Horse, Baby perambulators.
	(C) Making of wooden toys from wood saw dust with the help of moulds. Material required for making moulded toys, preparing the material by mixing wood saw dust with glue paste and white clay. The moulding process should be completed while the material is in plastic state.
10th and 11th Month	
(A) Knowledge of various types of wood suitable for making wooden lacquered objects—The wood should be light in weight, have compact grains, and easy to work. Further it should be of light colour so that pattern of desired colour scheme can be obtained on the finished objects.	(A) Practice in making simple round lacquered objects such as round stands for dolls and toys, pin cushions. Wooden lacquered articles can be made with hand, pedal or power operated lathe as described below:—
(B) Use of gauges for making round objects of specific dimensions.	"Wood is cut with a saw to the required size and then held between the head and tale stock of the lathe.

Theory	Practical
(C) Description of process of making coloured lac. Coloured lac is made by mixing dyes with lac which has been previously heated to plastic State. The lac should be of best quality and translusent. Milky white coloured lac is prepared by mixing lithophone with lac in the ratio of 5 : 8. Yellow coloured lac is prepared by mixing lemon chrome pigment with lac in the ratio of 1 : 2. Other coloured lac can be prepared by mixing dyes either with white coloured lac or with yellow coloured lac. The percentage of dyes would depend upon the shade of the coloured lac to be prepared. For instance red green and blue coloured lac are prepared by mixing Rodmin Rose Dye with yellow lac coloured lac, Vegetable green dye with yellow coloured lac and peacock blue with white coloured lac respectively.	It is then trued to the required shape and size with hand operated wood turning and surfacing tools and its surface is made even with sand paper. Lacquering is done by pressing coloured lac against surface of the object while it is rotating on the lathe. After the coloured lac has been applied screw pine leaf is pressed against the lacquered portion of the object so that the coloured lac is spread over evenly and also it gives desired lustre to the object". Practice in making lacquered wooden lamp stands, rattles, powder boxes, flower vases, cradles, pen holders etc.
12th Month	
(A) Revision of lessons in theory.	(A) Revision of practical exercises in wooden toys and allied crafts including lacquering.
(B) Lesson on principles and benefits of Cooperatives, organisation of Co-operative Societies, procurement of materials and marketing of finished articles and maintenance of records and books of Cooperative Societies.	(B) Examination in practical work.
(C) Examination in Theory.	

List of tools required for making wooden handicrafts including Fret-saw toys & Lacquer wares

Sl. No.	Name and specification of tools	Approx. cost	Functions of tools
		Rs.	
1.	Set of firmer chisels (size 1/16″, ⅛″ 3/16″, ⅜″, ½″, ⅝″, ¾″, 1″).	15	Used for making joints.
2.	Set of Mortise chisels (size 1/16″, ⅛″, 3/16″, ¼″, ⅜″, ½″, ⅝″, ¾″, 1″)	20	Used for making slots.
3.	Panel saw, 18″ long	5	Sawing of wood.
4.	Tenon saw 12″ long	4	Sawing of small pieces of wood.
5.	Light back saw 6″ long	2·50	Used for sawing of wood in irregular direction.
6.	Adze with wooden handle 1 lb. & 2 lbs. ..	4	Used for rough shaping of wooden pieces.
7.	Set of bastered and fine rasp files of different types—round, half round, Triangular, flat & square (size 6″ and 8″ long).	20	Used for smoothing surfaces of objects.
8.	Jack plane of steel (size 8″ and 12″)	140	Used for surfacing of wooden objects.
9.	Wooden smoothing planes (6″ long) ..	7	Used for surfacing of wooden objects.
10.	Wooden compass plane (4″ long)	5	Used for surfacing curved parts of objects.
11.	Marking gauge (size 2½″)	2	Used for marking lines.
12.	Steel hammers of one lb. weight (Ball pane and cross type).	3	Used for hammering.
13.	Mallet 2½ lbs. and 7″ long	3	Forming shape of sheet. steel or other metals sheet bodies.
14.	Measuring steel scales (6″, 12″ and 24″ long wooden folding scales).	5	Used for measuring tools, size of object etc. etc.
15.	Steel try square (6″, 12″ and 24″ long) ..	15	Used for measuring right angles and checking of surfaces of wooden objects.
16.	Set of screw drivers (4″, 6″ & 8″ long) ..	4	Fixing and removing of screws.
17.	Oil and water stones for sharpening of hand tools (size 6″ × 3″ × 10″).	6	Used for sharpening of tools.
18.	Spoke shave	5	Used for shaving of small size wooden pieces.
19.	Sash Cramp 24″ long	30	Used for holding pieces of wooden article to be joined together with glue paste and tightening of joints.

Sl. No.	Name and specification of tools	Approx. cost	Functions of tools
		Rs.	
20.	Ratchet Brace 12″ long and set of its size ¼″, ⅜″ and ½″.	20	Used for drilling holes.
21.	Hand operated drilling machine with drills 1/16″, ⅛″, 3/16″ and ¼″.	20	Used for drilling holes.
22.	Set of centre bits (1/16″, ⅛″, 3/16″, ¾″)	5	Required for marking centres of holes.
23.	Divider 8″ & 12″ long (screw and spring type)	20	Required for marking circles and arches on objects.
24.	Carpenter saw tooth setter	15	This is required for setting teeth of the saws in required position.
25.	File for sharpening teeth of saw	5	For sharpening teeth of saws.
26.	Hand vice (size of jaw 2″)	22	Holding small objects.
27.	Bench vice (size of jaw 4″ or 5″)	40	For holding jobs.
28.	Side cutting pliar 6″ long	3	For cutting metal nail.
29.	Spirit level with wooden body 6″ long ..	4	For checking surfaces of wooden pieces of objects.
30.	Electrically operated circular saw fitted on wooden table.	50	
31.	Hand operated bow type wood working lathe including tools.	50	
32.	Electrically operated wood working lathe including toolset	1,000	
33.	Pedal operated fret sawing machine ..	130	
34.	Electrically operated spray painting equipment	1,600	
35.	Electrically operated sand papering machine	600	
36.	Electrically operated portable sander ..	200	

FRUITS AND VEGETABLES CANNING AND PRESERVATION

THEORY

1. The present status of Fruit and Vegetable Preservation Industry and its role in the economy of the country.

II. General principles and methods of Fruit and Vegetable Preservation :

Preservation by heat, chemicals, sugar, salt, fermentation, drying, etc.

III. *Canning and Bottling of Fruits and Vegetables* :

(i) *Can Seam Technology* : General description of different types of seamers, Dixi Seamer in detail, Seam testing and measurements.

(ii) *Home canning equipment* : Their brief description, cost and their sources of availability. Canning equipment for commercial scale production.

(iii) *Methods employed in canning* : Washing, grading, blanching, peeling, filling, exhausting and processing, etc. Consideration for laying out a cannery.

(iv) Preparation of syrups and brines for canning purposes.

(v) *Canning and bottling of fruits commonly grown in India* : Mangoes, pineapples, guavas, pears, peaches, apricots, plums, figs, strawberry, orange segments, grape-fruit segments, grapes, bananas, etc.

(vi) *Canning and bottling of vegetables* : Green and processed peas, green gram, spinach, tomatoes, carrots, cabbage, cauliflower, etc.

(vii) *Spoilage in canned fruits and vegetables* : General types of spoilage and their control.

IV. *Fruit and Vegetable juices* :

(i) *Unfermented beverages (sweetened and unsweetened)* : Methods of juice extraction, home and commercial scale equipment for juices, squashes and cordials, clarification of fruit juices, their methods of preservation, etc.

(ii) *Preparation and preservation of juices, squashes and cordials* : From citrus fruits, *viz.*, malta sathgudi and mosambi, oranges, sangtra, galgal, lime, lemon and grape fruit, mango, phalsa, jaman, grape, mulberry, apple, pomegranate, carrot etc.

V. *Jams, Jellies and Marmalades* :

(i) *General* : General methods of preparation of jams and jellies—Use of jelimeter, etc., Home scale equipment, equipment for commercial scale production and bulk storage of fruit pulps as base for jam making.

(ii) *Recipes for the manufacture of jams, jellies and marmalades* : Plum jam, apricot jam, peach jam, pear jam, papaya jam, mulberry jam, raspberry jam, strawberry jam, guava jelly, lemon jelly, etc. Citrus marmalades from fruits like maltas, khatta (citrus aurantium), sangtra and galgal (citrus limonia).

VI. *Butters, Preserves and Candied Fruits* : Definitions, fruit butters from fruits like pears, peaches, plums and apricots—preserves and their general methods of preparation. Preparation of preserves from fruits like mango, amla, apple, quince, petha, etc.; candy fruits : General principles and methods of candying of orange peels, bers (ziziphus jujubes), etc.

VII. *Tomato Products* : Tomato juice, tomato puree, tomato soup, tomato ketchup and chilli sauce, etc. Mircobiology of tomato products.

VIII. *Pickles, Sauces and Chutneys* : Vinegar pickles, General methods of preparation, equipment, washing, salting, steeping in priming vinegar, bottling; sweet and acid pickles; pickling of some important Indian vegetables like cauliflower, onion, red pepper, cucumber, green tomatoes, etc.

Recipes for the preparation of sauces and chutneys : Mango chutneys, green mango pickles, pickled water-melon rind, lime and lemon pickles and important sauces like Worcestershire sauce, etc.

IX. *Vinegar Making* : Definition, General methods of preparation of vinegar, alcoholic fermentation, acetic fermentation (by slow and quick generator method); control of temperatures, ageing of vinegar, finding of vinegar, pasteurizing and bottling of vinegar, diseases of vinegar, vinegar from some waste Indian fruits like dates, mangoes, apples, etc.

X. *Drying of Fruits and Vegetables* : Sun drying and mechanical dehydration of fruits and vegetables. Equipment, drying of mango pulp (Am paper), green mangoes (Am chur), apples, bananas, plum and grapes, cauliflower, potatoes, peas, carrots, etc.

XI. *By-products from Fruit and Vegetable Wastes in a Factory* : By-products in a citrus juice factory; Essential oils of oranges, lemons and limes; pectin, citric acid and citrates; orange wine; utilization of waste from fruit preservation factories, *e.g.*, fruit peels, cores, pits and stems and other wastes from canning of tomatoes, peas, etc.

PRACTICAL

The availability of fruits and vegetables depends on the season of the year. Different kinds of fruits and vegetables are grown in different parts of the country. Hence the programme of practical training, in this centre will have to be adjusted according to the availability of fruits and vegetables

in that season. In each centre preservation of those things should be taught which are grown in abundance in that area.

1. Preparation of mango, lemon, kathal (jack-fruit), chillies, carrot, onion, cauliflowers and turnip pickles.

2. Preparation of orange squash, lemon squash, grape fruit, mango squash, litchi squash, bel squash, lime juice, cordial lemon, barley water.

3. Preparation of rose, kewra, khas syrups (from arqs and essences) almond, orange, lemon, pomegranate, grape, pine-apples, phalsa, bel syrups.

4. Preparation of ready to serve beverages from apple, apricot, plum green ripe mangoes, pine-apples, litchis etc.

5. Preservation of juices—grapes, apple, orange, grape fruit, tomato juices.

6. Storage of apple, apricot, peach, plum, mango, guava, pulps.

7. Preparation of mango, papaya, mix fruit chutney.

8. Preparation of apples, apricot, peach, plum, pear, gooseberry, strawberry, mango, guava and mix fruit jams.

9. Preparation of guava jelly, apple jelly, jack fruit jelly.

10. Preparation of guava toffees, karonda jelly, grape fruit and orange marmalades.

11. Preparation of amla, apples, bel, karonda, ginger, carrot, 'har' murabba.

12. Preparation of petha candy, crystallised ginger and karonda.

13. Preparation of candied peels for orange, lemon, papaya.

14. Canning of pine-apple, guava mango, papita, litchi, pears, peaches, apricots, grape fruits and oranges.

15. Canning of peas, green gram, cauliflower, tomatoes in brine and of curried vegetables *viz.* peas and tomatoes, pears and cauliflowers, tomatoes and peas, etc.

16. Sun-drying of peas, cauliflowers, turnips, carrot and dehydration of potatoes, bananas, raw mango and mango pulp, preparation of jams, sugarcane and molasses vinegar.

17. Bye product in Fruit Preservation Factory and its utilisation.

18. Analytical.

1. Determination of Brix by
   - (*a*) Brix hydrometer.
   - (*b*) Refractometer.
   - (*c*) Indirect method (through specific gravity by Hydrometers and referring to tables).

2. Determination of Acidity :
   - (*a*) in juices
   - (*b*) syrups, squashes, etc.
   - (*c*) fresh and dehydrated fruits
   - (*d*) jams, jellies and marmalades.

3. Detailed cut-out tests for fruits and vegetable products.

BREAK-UP OF THE SYLLABUS : DURATION 25 WEEKS

Details of practical work	Demonstration	Lecture
First Week		
Sketching the equipment and studying their operation. (1) Balance-Counterpoise (2) Balance with small wt. grains (3) Can sealer-Burpee's type	(1) Check wts. and keep the balance clean and sensitive. (2) Adjust sensitiveness of balance. (3) Method of sealing cans of different sizes.	Functions of each equipment, their cost, alternate ones — electrically operated are useful only under certain conditions.
(4) Cooking pan (5) Crown corking machine (6) Hydrometer 0°—90° (7) Home drier 3′×2′×3′ (8) Mix master (electrical) (9) Lime juice squeezer (10) Thermometer C	(4) Method of corking, size of corks. (5) Careful use of glass Hydrometer and how to take readings. (6) Method of working of drier, protection of oven.	Spare parts replacements. Sketching the different parts.
(11) Salometer (12) Pressure Cooker (13) Vacuum gauge (14) Stove (15) Metal cans of different sizes	(7) Operation in different modes. (8) Method of reading temperature. (9) Operation of cooker sealing, reading the pressure. (10) Operation of stove, cleaning, maintenance of pump and washer in condition. (11) Lacquering of cans.	
Second Week		
(1) Sterilising cans, bottles with steam.	Boil water and dip cans and bottles and sterilize with steam and show ordinary can and bottle unsterilised and how they get fungus and bacteria.	Principles of preservation — heating, boiling and sterilisation pasteurisation for killing bacteria and moulds, fungi bacteria, micorganisms, dangers of infection and contamination.
(2) Preservation by dehydration and sun-drying and oven-drying.	Removal of moisture, slow drying of salted mangoes, banana chips, sulphuring and sun-drying raisins, figs, mango-pulp, potato chips. Method of washing, peeling, trimming, slicing and stredding, sulphuring in trays, drying temperatures, use of drying oven.	Role of moisture in fruit and vegetables—danger of moisture in dehydrated products, resisting and cleaning products before treatment.
(3) Permanent preservation with antiseptics using sugar at 70% or over, salt of 15% fermentation preservation in vinegar and exclusion of air.	Preparation of syrups and vinegar by fermentation. Use of grapes, apples, orange from other juicy fruits, or honey, extraction of juice, addition of sugar to make 12—15 Brix, fermentation, acetifeation sterilisation and bottling	Fermentation process, principles, importance of sanitation, influence of temperature, determination of boiling with hydrometer storage and ageing of vinegar.

Details of practical work	Demonstration	Lecture
Third Week		
(1) Canning and bottling of fruits. (2) Checking products, testing leakages. (3) Glass containers and sealing them. (4) Fruit bottling (5) Sealing and waxing of bottles.	(1) Preservation of fruits and vegetables in hermetically sealed cans or bottles. (2) Clip bottles, screw rubber ring bottles. (3) Home-made seals, paraffin wax paper making.	The can, plain and lacquered cans and their functions. Sterilisation of cans, ordinary cans and sanitary cans, distinguish and note their functions. Bottles, their quality defects, types and cost——Processing time for bottling and canning
Fourth Week to Seventh Week		
1. Canning and bottling of fruits: (*a*) Mango (*b*) Melon (*c*) Guava (*d*) Litchi (*e*) Pineapple (*f*) Cherries (*g*) Pears (*h*) Plums (*i*) Figs (*j*) Jack (*k*) Locquat (*l*) Papaya (*m*) Strawberries	Method of selection of fruits, firm and fully developed, sound ones of uniform colour appearance, maturity, washing, cleaning and avoiding damaged or wounded portions. Method of preparation of syrup, filling, exhausting, sealing.	Bottling and canning its functions, sterilisation, syrup preparation and sealing. Economics— Cost of containers, Working out cost of home scale. Methods of display, packing storage and marketing. Defects in canned and bottled products and how to avoid them.
Eighth to Tenth Week		
1. Canning and bottling of vegetables: (*a*) Beans (*b*) Peas (*c*) Potato (*d*) Cauliflower (*e*) Cabbage (*f*) Beet root (*g*) Ladies finger (*h*) Tomato (*i*) Brinjal (*j*) Turnip	Canning, time-table for non-acid vegetables. Selection of material, washing, cleaning, blanching, dipping in boiling water as per time schedule. Preparation of 2-3% common salt brine solution for filling, exhausting and closing and processing the sealed container at 240° C as per time-schedule and cooling.	Acid and non-acid vegetables, scalding and blanching of vegetables, use of lime sterilisation. Testing the canning and bottling and working out economics. Storage and packing of products.
Eleventh and Twelveth Week		
1. Canning and bottling of curried vegetables. (*a*) Brinjal (*b*) Beans (*c*) Potato (*d*) Ladies finger (*e*) Tomato (*f*) Cauliflower (*g*) Potato & pea (*h*) Potato, pea and cauliflower (*i*) Potato, pea, cauliflowers and tomato.	Selection of material—mature and tender ones, removal of non-edible portions, cleaning, slicing or peeling. Preparation of gravy liquid medium as per schedule, filling the cans, exhausting and sealing. Processing and sterilisation at 240° F for one hour in pressure cooker. Cooling and storage.	Difference between brine storage and gravy medium, flavouring and addition of spice for taste, scalding time, cost of product compared, storage—Processing precautions, checking defects.

Details of practical work	Demonstration	Lecture
Thirteenth Week		
1. Canning and bottling of pickles : (*a*) Mango (*b*) Lime (*c*) Lemon (*d*) Turnip (*e*) Bamboo (*f*) Onion (*g*) Tondli (*h*) Parwal (*i*) Other citrus like sweet lime	Selection of material, tender stage, cleaning curry, in brine, pickling, spicing, sweet and Pungent pickles with and without vinegar.	Village methods of pickling, easy adoptability, method of working in cottage industry scale, merit of different pickles, consumer preference, costs and economics of each product.
Fourteenth and Fifteenth Week		
1. Preparation of fruit juices: (*a*) Mango juice (*b*) Orange juice (*c*) Lime juice (*d*) Apple juice (*e*) Pine apple juice (*f*) Cashew apple juice (*g*) Spiced carrot (*h*) Tomato (*i*) Grape (*j*) Passion (*k*) Amla (Gooseberry)	Selection of fully ripe and well-developed fruits free from bruis, washing, spraying, cleaning, cutting grafting, slicing etc., and extraction of juice, addition of sugar, immediate heating to 180—185° F in direct fire, pouring and filling in sterilised bottles and sealing or crown corking. Pasteurisation and cooling.	Fruit juices and the object of sweetening fruits suitable for juice syrup storage, quantity of sugar syrup to be added, filtering, straining bottling and processing methods. Economics of each product and checking the products and finding out defects.
Sixteenth Week		
1. Preparation and preservation of squashes and cordials : (*a*) Orange squash (*b*) Lime and lemon squash cordial (*c*) Phalsa squash (*d*) Jaman squash (*e*) Apple squash (*f*) Roselle squash (*g*) Passion fruit	Selection of good fruits, fully ripe, with flavour and aroma. Washing, cleaning, slicing, cutting. Extraction of pulp, removal of seeds, strain pulp and sieve, mix sugar, citric acid, heat and preservative bottles in sterilised bottles and cork air tight.	Difference between juice, squash and cordial clarification methods, preservation methods use of chemicals, sediments, defects, in processing. Discuss popular ones and work out cost.
Seventeenth to Nineteenth Week		
1. Preparation of fruit jams : (*a*) Mango (*b*) Pineapple (*c*) Sapota (*d*) Loquat (*e*) Mixed fruit (*f*) Orange marmalade (*g*) Tomato ketchep (*h*) Guava cheese (*i*) Strawberry (*j*) Roselle jams	Selection of fruits of good colour maturity, ripeness, aroma and flavour, washing, cleaning, eliminating all bruised parts, cutting or grating or crushing addition of sugar, acidifying cooking at 222° F and boiling hot filling in sterilised jars or cans or bottles. Sealing and cooling.	Use of ripe and unripe fruits for consistency in jam role of sugar in set of the same addition of acids like citric acid. Test for well set jam, slow cooling before addition of sugar, fast rapid cooling after sugar addition, Testing set by wt., volume temperature, flake, cold plate, packing storage, defects like crystillisation, jelly formation, fermenting etc. Discuss economics.

Details of practical work	Demonstration	Lecture
Twentieth Week		
1. Preparation of jellies: (*a*) Guava (*b*) Wood apple (*c*) Apple (*d*) Roselle (*e*) Loquat (*f*) Jack fruit	Selection of hard and firm fruits, washing, cleaning cutting the fruit, addition of water, citric acid, boil the mass, crush until develops, screen through coarse cloth, extract, add pomace water by ½ wt. and take extractor. After three extractions, test pectin add sugar and cook 222° F. Pack and store in sterilised cans and bottles.	Principles of jelly making, addition of pectin and balanced proportion of pectin, sugar and acid suitable fruits packed in pectin pectru test, finishing points of jelly, cost of products.
Twenty First Week		
1. Preparation of candy: (*a*) Petha (ash gourd) (*b*) Kumuat (*c*) Ginger	Selection of ripe material, firm skin, washing, cleaning softening or puncturing and boiling with 0·5% citric acid—cooking—pricking again. Soak in syrup of 30° Brix-boil allow stay overnight every 24 hours, drain syrup and increase concentration by 5% Brix—Increase up to 60% Brix. Add Citric acid syrup and increase to 75% Brix and pressure.	Candid or crystallized fruits, increase in clevity of syrup in gradual stages, working out time schedule, use of surplus syrup candying peels of citrus fruits.
Twenty Second and Twenty Third Week		
1. Dehydrated products-preparation of: (*a*) Potato chips (*b*) Mango bether (*c*) Banana chips (*d*) Dehydrated ripe banana (*e*) Dehydrated date (*f*) Dehydrated fig (*g*) Dehydrated grape (*h*) Dehydrated pear (*i*) Dehydrated apple (*j*) Dehydrated apricot (*k*) Dehydrated Plum	Details of products, selection of material, preparation of fruit— cleaning, peeling, cooking, slicing, use of wire trays, drying in the oven, continuous maintenance of temperature and regulation of heat in the drying oven between 120°—150° F and increasing gradually to 160° F.	Principles of dehydration, role of sugar, salt, syrup in preservation. Principle of dehydration, common defects in dehydrations. Moulds lumpiness, uneven drying, bad effects of moisture. Cost of different products per lb.
Twenty Fourth and Twenty Fifth Week		
1. Preparation of Misc. products: Groundnut milk Sago from tapioca Date palm 'neera' Amla Murabba Chutneys etc.	Select good matured groundnut, kernels, dehusk, soak in hot water for 5—10mts., removal of skin, prepare a paste of kernel using stone grinder with 1½ quantity of water. Dilute paste with four times water filter through muslin cloth. Add 1 lb. of saturated lime water to the paste 4 lb. and stir, make emulsion, heat and pass steam for 45 mts. Cool the milk in a tank of water. Add 1 gm. sodium citrate to 1 lb. of milk. Curd can be made by using starter.	Importance of subsidiary foods, their nutritive value, preservation of ground nut milk curd. Preparation of sago on a cottage industry scale from tapioca, visiting sago, making units if they are nearby. Importance of locally made stuff like Murabba, chutney etc.

LIST OF MODEL ITEMS FOR TRAINING IN FRUIT AND VEGETABLE PRESERVATION AT THE ARTISAN TRAINING CENTRE

1. *Canning and bottling of fruits:*
   1. Mango
   2. Melon
   3. Mang |
   4. Guava
   5. Litchi
   6. Pineapple
   7. Cherries
   8. Pears
   9. Plum
   10. Figs
   11. Jack
   12. Loquat
   13. Papaya
   14. Strawberries

2. *Canning and bottling of vegetables:*
   1. Peas
   2. Potatoes
   3. Beans
   4. Carrots
   5. Cauliflower
   6. Cabbage
   7. Beet root
   8. Ladies finger
   9. Tomatoes
   10. Brinjals

3. *Canning of curried vegetables:*
   As above.

4. *Canning and bottling of pickles:*
   1. Mango
   2. Lime
   3. Turnip
   4. Bamboo
   5. Jack
   6. Other citrus fruits like banana
   7. Onion
   8. Tondli (coccinea)

5. *Preparation of fruit juices:*
   1. Mango
   2. Orange
   3. Lime
   4. Apple
   5. Pineapple
   6. Cashew apple
   7. Spiced carrot
   8. Tomato
   9. Grape
   10. Passion fruit
   11. Amla
   12. Other citrus fruits.

6. *Preparation and preservation of squashes and cordials:*
   1. Orange
   2. Lime and lemon
   3. Mango
   4. Lime juice cordial
   5. Phalsa
   6. Jaman
   7. Passion fruit
   8. Apple
   9. Fig
   10. Roselle (calyx)

7. *Preparation of jam:*
   1. Mango
   2. Pineapple
   3. Loquat
   4. Mixed fruit
   5. Sapota
   6. Orange marmalade
   7. Tomato ketchep
   8. Guava cheese
   9. Strawberry
   10. Papaya

8. *Preparation of jellies:*
   1. Guava
   2. Wood apple
   3. Jack fruit
   4. Loquat

9. *Preparatin of candy:*
   1. Petha candy
   2. Loquat
   3. Ginger
   4. Cashew apple
   5. Bamboo.

10. *Dehydrated products:*
    1. Potato chips
    2. Mango leather
    3. Banana chips
    4. Dehydrated ripe banana
    5. Apricots
    6. Date
    7. Figs
    8. Apples
    9. Grapes
    10. Pears
    11. Plums

11. *Miscellaneous products:*
    1. Preparation of groundnut milk
    2. Preparation of date palm neera
    3. Preparation of Sago from tapioca
    4. Preparation of toffee
    5. Preparation of mixed squash or blended drinks like pepsi cola.

LESSON NOTE AND RECIPES

PRESERVATION OF NEERA

1. Collect Neera in good, clean preferably sterilized, new pots. Of course, lime may be used sparingly to smear the inside, but this might interfere with the quality of Neera during prolonged storage.

2. Cover them tight with good, clean cloth until used.

3. Bring them over to the workspot and pasteurise the Neera as follows as quickly as possible. The time-lag should be the minimum between [(1) and (3)] collection and pasteurisation.

4. Add at least 0.5% by weight citric acid (the greater the percentage of Citric Acid added the better and the stabler the juice/during prolonged storage but this depends on the purpose to which the Neera is subsequently put, the length of storage, etc.

5. Add also Sodium Benzomate @ about ¼—1/5 the normal dose, *i.e.* 0.025—0.020%.

6. Raise the Neera quickly to a boil or at least 195°—200°F.

7. Fill into (previously sterilized) bottles to overflowing at a temperature not less than 180° F. This is extremely important to kill all the yeasts, —the most troublesome in Neera.

8. Crown-Cork the bottles at once. Use previously sterilized corks.

9. Let the bottles cool off of their own accord, away from droughts, store in a cool, dry place until required, preferably in a refrigerator or cold store.

Note 1. Modifications could be introduced depending upon the ultimate use of Neera and its probable period of storage.

2. Neera could be blended with any fruit juice with flat aovontag or flavoured with any desired essence or cocktail, etc. etc.

PREPARATION OF FRUIT SQUASHES—SIMPLE RECIPES AND PRACTICAL TIPS

For simplification of recipes, fruits may be divided broadly into the following three groups based on their acidity :

1. *Low-acid fruits* : Chinese, Batavian or Musambi oranges, Kamala or Sangtra oranges, Mangoes, Pineapples, Grape, Tomato, Pomegranate, Cashewapple, Water Melon, Musk Melon, Jaman, Falsa, and other similar fruits. The addition of citric acid is necessary in squashes prepared out of these fruits in order to make the beverage palatable and give it the right sugar-acid blend.

2. *Medium-acid fruits* : Sour oranges like Vadapudi, Kichili, etc. Amla Passionfruit and the like. Squashes from these fruits are usually self-sufficient in acid. They may, however, need to be acidified some times as, for instance, Vadlapudi oranges available in summer.

3. *High-acid fruits* : Acidlimes, lemon, Dabba or Gajanimma citrons and the like.

These fruits are already high in their acid content. No citric acid need, therefore, be added to the beverages made from them.

Recipes for these three categories of fruits are now furnished hereunder :

Ingredients	Class (1) fruits I	Class (2) II	Class (3) III
1. Fruit Juice (parts preferably by wt.) ..	3(30%)	2(33⅓%)	1(25%)
2. Water	2(20%)	1(16⅔%)	1(25%)
3. Sugar	5(50%)	3(50%)	2(50%)
4. Citric Acid	1% of the wt.	Usually not necessary to ¼ to ½ % may be added if the beverage is too sweet or lacks the taste.	Unnecessary.
5. Preservative	Dose is the same for all these 3 classes—		

*Potassium metabisulphite: 1 oz or 2½ tolas or 28 gms. for 100 pounds of the finished product.

*It is not advisable to use this in the case of purple grapes, jaman, falsa, pomegranate and similar purplish red fruit juice as it bleaches their attractive colour. In such cases sodium benzoate may be added at the rate of 1.6 oz or 45 gms. or 5 tolas for 100 pounds of the squash.

Step-by-step practical hints are now given below for the actual preparation of the squashes. It is to be noted at the outset that fruits which are sucudlent and juicy are the best for making squashes and other beverages.

(1) Select fully ripe fruits. See that they are free from disease or decay.

(2) Wash thoroughly in good clean water.

(3) Extract the juice by squeezing or pressing or reaming with a suitable tool or appliance.

(4) Filter to remove seed, coarse pulp, fibre and any other undesirable matter.

(5) Boil water as per recipe and dissolve the sugar. Also add citric acid to the syrup where necessary. Remove the scum and filter clear. Let the syrup cool a bit.

(6) Mix the juice and the syrup.

(7) Dissolve the preservative in a little warm water and mix it thoroughly with the squash.

(8) Fill the squash into bottles which have been thoroughly cleaned with soap or other suitable detergent and hot water.

(9) Close the bottles tight with good, clean corks.

(10) Invert the bottle and dip the cork for a second or two in molten wax. This will make the bottles airtight and leak-proof.

(11) Store the bottles preferably in a cool, dark place.

Squashes preserved this way normally keep for one or two years. Even after opening, they can be used over a period of two weeks without any fear of spoilage. They may be diluted before use with three or four volumes of water or soda.

JAM MAKING—SIMPLE RECIPES AND PRACTICAL TIPS

Jam is a product obtained by boiling fruit or fruit pulp with sugar to a thick consistency.

Fruits which are fleshy or pulpy rather than juicy are, therefore, the best for jams, Bananas, Mangoes, Jack Papaya, Pineapple, Custardapple, and Wood apple are some of the suitable ones.

Jam making is easy and simple. The following recipe and step-by-step practical instructions can help one make real good jams.

RECIPE

1. Fruit Pulp or slices	1 Part preferably be weight
2. Sugar	1 part
3. Citric Acid	0·25 to 0·5 % of the combined wt. of fruit pulp and sugar depending on the natural acidity of sweetness of the fruit and one's own taste. or 1 to 2 gms per pound of pulp-sugar mixture.

PRODUCTION

1. Select fully ripe fruits, see that they are free from disease or decay.

2. Wash thoroughly in good clean water.

3. Remove all inedible or unwanted matter like peel, seed, core, etc.

4. Cut into slices or reduce to pulp by crushing or mincing with suitable tools or appliances.

5. If the slices are hard or the pulp is raw, cook with a minimum of water until soft or tender enough. Beat or mesh well.

6. Heat to boil. Add sugar slowly, stirring all the time to prevent charring.

7. Boil vigorously on a strong fire. Take care to prevent scorching of contents.

8. Watch carefully for the finished point. When the mixture attains the consistency of Halwa and fall of the edge of a ladle in thick sheets or flakes, it is done. Also, no free liquid is seen and bubbles nearly cease at this stage.

9. Dissolve the citric acid in a little warm water and stir the solution into the product.

10. Remove from fire and let cool for some time.

11. Fill into clean, wide-mouthed screw jars when sufficiently cooled. Cover with a thin layer of molten paraffin and close the jars tight with screw caps. Tins can be filled and sealed when the jam is fairly hot.

12. Store the jars and tins preferably in a cool, dry place.

NOTE :—Tools and utensils should be non-corrodible, like Aluminium or preferably nickle, stainless steel etc. Iron, copper and brassware should **be avoided except when heavily tinned.**

PREPARATION OF AMLA CANDY AND AMLA PRESERVE (MURABBA)

Amla candy (*slow method*)

1. Select fully developed and mature fruits free from disease, blemishes, etc.

2. Wash them thoroughly in water free from soil, dirt, etc.

3. Remove stalks.

4. Prick the fruits all over with a dining fork or with sharp needles or strong, clean wild date thorns tied into a cluster.

5. Prepare 30% sugar syrup by dissolving three parts of sugar in seven parts of clean, drinking water, preferably by weight. Boil and filter the syrup to remove the impurities present in the sugar.

(*Note* :—The quantity of syrup made should be sufficient to keep all the fruits completely submerged.)

6. Put the fruits in the above syrup and boil them together for 5 minutes. Transfer them to a clean, dry china or earthen jar, cover the jar tightly with lid and seal with a little molten paraffin wax or tie with a clean piece of cloth. See that all the fruits are fully immersed in the syrup.

7. On the third day, open the jar and test the % sugar in the syrup with a Brix hydrometer. Add enough sugar to the syrup to raise the Brix to 35 Deg. Boil the syrup and Amlas together for 10—15 minutes. Transfer to the jar and set aside after sealing it well.

8. Go on raising the % sugar in the covering syrup by 5 Deg. Brix on every alternate day until it attains 72 Deg. Brix. Boil the Amlas and syrup together for five minutes every time sugar is added.

9. Keep the Amlas in the final syrup until there is no fall in its Brix value. Make up the decrease in the Brix by adding requisite amounts of sugar.

10. When the Brix value of the syrup remains almost constant at 72 Deg., remove the Amlas from the syrup by draining well on a sieve.

11. Thoroughly dry the Amlas in sun until free from stickiness.

12. If desired, the dried Amlas may be rolled in clean sugar so that the crystals of sugar will stick to them all over imparting a fine appearance to the candy.

13. Pack the candy in good, clean glass or china or earthen jars which can be tightly closed or sealed and store the containers in a cool dry place.

Amla preserve* (*Murabba*) *Quick method

Note : The preparation of Amla candy according to the foregoing method involves the use of a Brix hydrometer (which may not always be available or possible to use for all people) and also considerable delay. To avoid these two drawbacks, one can make what is called 'Amla preserve' or amla murabba which is even more popular than the candy with many people. Although the essential principles of making candy and preserve are the same, the later is much simpler and easier to make. The method is outlined below :—

1. Select, wash and prick the fruits as for candy—*vide* steps (1) to (4) given for candy above.

2. Prepare about 40% sugar syrup by dissolving two parts of sugar in three of clean drinking water (by weight or even by measure). The quantity of syrup prepared may be about double the quantity required to keep the fruits fully submerged.

3. Place the Amlas in this syrup and boil (concentrate) slowly on a mild fire without cover so that the syrup gradually become thicker and thicker until finally it attains the consistency of honey. The process may take some hours, depending upon the quantity of Amlas used. If large quantities of fruits are to be handled, it is advisable to do the above concentration in two or three stages on two or three successive days. The slower the rate of concentration, the better and the longer the preserve will keep free from spoilage.

4. When the syrup finally attains about the consistency of honey, pack the Amlas alongwith syrup in glass or china or earthen jars, seal them tightly and store in a cool, dry place.

NOTE :—Kumguat may be dipped in boiling water for a few minutes (say about 5 mts.) to ocbilter them (by removing much of the oil from their skins) before pricking them all with the needles.

LIME JUICE CORDIAL

Equipment required

1. Aluminium or stainless steel Bhagonas (Patilas).
2. Lime Juice Squeezer.
3. Aluminium sieve or mosquito net cloth.
4. Stove or Angithi.

Formulae

1. Juice	4 parts
2. Sugar	5 parts
3. Water	4 parts

Method of preparation

1. *Selection of fruit and preliminary treatment* :—Fully ripe fresh fruits, free from fungal attack are taken. Fruits are thoroughly washed under cold water sprays to remove dirt, dust and adhering matter.

2. *Preparation of fruits and extraction of juice* : Fruits are cut into halves and juice is extracted with the help of wooden juice squeezers. In the case of lemon the fruit is cut into halves and pressed on conical plate and rotated to extract juice. The juice is strained through an aluminium sieve 1 m.m. mesh or mosquito net cloth to remove seeds or skin, if any. Store the juice in large sized glass containers adding Potassium-meta-bi-sulphite at the rate of 1 tola for every 10 srs. of juice and allow it to settle for about a month. Take the upper clear liquid and strain through a fine muslin cloth.

3. *Preparation of syrup for Cordial* : Sugar and water are taken in an aluminium or stainless steel Bhagona and kept on fire and stirred till the sugar dissolves. The syrup is then strained through muslin cloth and kept for cooling.

4. *Mixing of juice and syrup* : When syrup is sufficiently cooled down fruit juice is mixed with syrup and stirred thoroughly.

5. *Addition of preservative* : Potassium-meta-bi-sulphite at the rate of 2¼ grains per lb. of the finished product is taken, dissolved in a small amount of water and then mixed with cordial.

6. Pour the product into bottles, which have been thoroughly cleaned and previously heated in boiling water for 15-20 minutes, leaving head space of 1-1½ inches. Cork air-tight and store in cool dry place.

LIME OR LEMON SQUASH

Equipment required

1. Aluminium or stainless steel Bhagonas (Patilas).
2. Lime Juice sieve or Mosquito net cloth.
3. Aluminium sieve or mosquito net cloth.
4. Stove or Angithi.

Formulae

1. Sugar	.. .. ..	1½ Parts.
2. Juice	.. .. ..	1 part.
3. Water	.. .. ..	½ part.

Method of Preparation

1. *Selection of fruit and preliminary treatment* : Select fully ripe fresh fruit, free from fungal attack. Fruits are thoroughly washed under cold water sprays to remove dirt, dust and adhering matter.

2. *Preparation of fruits and extraction of juice* : Fruits are cut into halves and juice is extracted with the help of wooden juice squeezers. In the case of lemon the fruit is cut into halves and pressed on conical plate and rotated to extract juice. The juice is strained through an aluminium sieve 1 m.m. mesh or mosquito net cloth to remove seeds or skin, if any.

3. *Preparation of syrup for squash* : Sugar and water are taken in an aluminium or stainless steel Bhagona and kept on fire and stirred till the sugar dissolves. The syrup is then strained through muslin cloth and kept for cooling.

4. *Mixing of juices and syrup* : When syrup is sufficiently cooled down fruit juice is mixed with syrup and stirred thoroughly.

5. *Addition of preservative* : Potassium-meta-bi-sulphite at the rate of 5 grains per lb. of the finished product is taken, dissolved in a small amount of water and then mixed with squash.

6. Pour the product into bottles, which have been thoroughly cleaned and previously heated in boiling water for 15-20 minutes, leaving head space of 1-1½ inches. Cork air-tight and store in a cool dry place.

A simple method of making lime and lemon squash without the addition of preservative is given below :

Take a clean glass bottle which has been previously washed with boiling hot water and fill the same with crystal sugar, free from impurities. Add into this as much lemon or lime juice as can be absorbed by sugar in the bottle. Instead of extracting juice from the fruit and storing it for some time, before use, it will be better if juice from lemons or limes is poured directly

over sugar in the bottle by placing fine mosquito net cloth at the mouth of the bottle to separate seed from the juice. In this way the juice retains the maximum amount of flavour. The bottle is then kept in sun shine and shaken constantly for dissolving sugar and later on stored in a cool dry place. Due to high percentage of sugar the squash, thus prepared can be stored in good condition for a long time without the help of preservative.

MANGO SQUASH

Equipment required :

1. Aluminium or stainless steel Bhagonas (Patilas).
2. Stove or Angithi.

Formulae :

1.	Mango pulp	1 part
2.	Water	1 part
3.	Sugar	2 parts.

Method of Preparation :

1. *Selection of fruit and preliminary treatment* : Fresh fully ripe but not over ripe mangoes are taken. Fruits are thoroughly washed under cold water sprays to remove dirt, dust and adhering matter.

2. *Preparation of fruits and extraction of juice* : The fruits are rubbed gently between the palm of hand to thin down the pulp as best as possible. Remove the stem end portion and squeeze out the pulp with hands (hands should be thoroughly washed with soap, preferably covered with rubber gloves). The pulp is pressed with aluminium sieve, with the help of bottom of mug or tumbler to get homogenized product.

3. *Preparation of syrup for Squash* : Sugar and water are taken in an aluminium or stainless steel Bhagona and kept on fire and stirred till the sugar dissolves. ½ tea spoon of citric acid powder is added for every seer of sugar for clarification of the syrup. The syrup is then strained through muslin cloth and kept for cooling.

4. *Mixing of pulp and syrup* : When syrup is sufficiently cooled down, fruit pulp is mixed with syrup and stirred thoroughly.

5. *Addition of preservative* : Potassium-meta-bi-sulphite at the rate of 5 grains per lb. of the finished product is taken, dissolved in a small amount of water and then mixed with squash.

6. Pour the product into bottles, which have been thoroughly cleaned and previously heated in boiling water for 15-20 minutes, leaving head space 1-½ inches. Cork air-tight and store in a cool dry place.

ORANGE SQUASH

Equipment required :

1. Aluminium or stainless steel Bhagonas (Patilas).
2. Hand Juice Extractor (Screw type).
3. Aluminium sieve or Mosquito net cloth.
4. Stove or Angithi.

Formulae :

1. Sugar	.. .. ..	$1\frac{1}{2}$ parts
2. Juice	....	1 part
3. Water	.. .. ..	$1\frac{1}{2}$ parts.

Method of Preparation :

1. *Selection of fruit and preliminary treatment* : Select fully ripe fresh fruit free from fungal attack. Fruits are thoroughly washed under cold water sprays to remove dirt, dust and adhering matter.

2. *Preparation of fruits and extraction of juice* : Loose skin oranges are peeled with the help of hands and segments separated. The segments are fed into screw type small juice extractor for the extraction of juice. Malta or Mussammi is cut into halves and pressed on conical plate and rotated on it to extract the juice. The juice is strained through aluminium sieve of 1 m.m. mesh or a fine mosquito net cloth, in order to remove seeds or skin of the fruit, if any.

3. *Preparation of syrup for squash* : Sugar and water are taken in an aluminium or stainless steel Bhagona and kept on fire and stirred till the sugar dissolves, $\frac{1}{2}$ tea spoon of citric acid powder is added for every seer of sugar for clarification of the syrup. The syrup is then strained through muslin cloth and kept for cooling.

4. *Mixing of juices and syrup* : When syrup is sufficiently cooled down, fruit juice is mixed with syrup and stirred thoroughly.

5. *Addition of preservative* : Potassium-meta-bi-sulphite at the rate of 5 grains per lb. of the finished product is taken, dissolved in a small amount of water and then mixed with squash.

6. Pour the product into bottles, which have been thoroughly cleaned and previously heated in boiling water for 15-20 minutes, leaving head space of 1-$1\frac{1}{2}$ inches. Cork air-tight, and store in a cool dry place.

CANNING OF GUAVAS

1. ***Selection of fruit*** : Select fully ripe sound, uniform fruit but it should not be soft. Prefer white round, variety with plenty of flesh and minimum seeds.
2. ***Preparation of fruit*** : Wash the fruit thoroughly in small lots in several changes of water. Peel the fruit evenly with stainless steel peeling knives. Cut into two halves and remove the core uniformly with corking knives. During preparation the fruit should be kept immersed in 2% salt solution to prevent browning of the fruit.
3. ***Preparation of syrup*** : Wash the fruit halves in cold water and pack them into plain cans. Prepare 40° Brix sugar syrup (sugar 1 part and water $1\frac{1}{2}$ parts) and pour boiling hot syrup leaving $\frac{1}{4}''$—$\frac{1}{2}''$ head space.
4. ***Exhausting*** : Exhaust the cans in boiling water, half dipped till the centre of the cans records a temperature of 170° F.—180° F. Seal the can air-tight immediately with a Can Sealer.
5. ***Sterilization and Storage*** : Sterilize the sealed cans (A$2\frac{1}{2}$) in boiling water for 25 minutes and cool them in running water. Wipe the cans dry and store in a cool and dry place.

CANNING OF MANGOES

Varieties Suitable : Safeda, Deshri, Alfanso, Neelum.

1. *Selection of fruit* : Select fresh, firm, canning ripe fruit of uniform maturity of canning varieties.
2. *Preparation of fruit* : Wash the fruit thoroughly in several changes of water to remove dirt etc. Peel the fruit uniformly with peeling knife. Try to cut two big slices as far as possible. During preparation keep the fruit immersed in 2% salt solution. Wash the slices in cold water and pack them in lacquered cans. Add boiling hot syrup of 40° Brix leaving ¼″—½″ head space.
3. *Exhausting* : Exhaust the cans half dipped in boiling water for 7-10 minutes till the centre of the can reaches a temperature of 175° F Seal the can immediately with the help of a can sealer.
4. *Sterilization and Storage* : Sterilize the sealed cans (A2½) in boiling water for 18 minutes. Cool the cans in running water. Wipe dry and store in a cool dry place.

CANNING OF PINE-APPLE

1. *Selection of fruit* : Select fresh, firm, fully matured, sound fruits, having maximum flavour and colour of selected canning variety.
2. *Preparation of fruit* : Wash the fruit to remove dirt, dust etc. Cut off the stem and portion and keep it right on a plate. Hold the crown of the fruit in hand and peel the fruit with sharp stainless steel knives. Trim off the eyes cross-wise, sufficiently deep to remove last traces of the eyes. Cut into ½″ thick slices. Remove the central core. During preparation, the fruit is kept immersed in water.
3. *Preparation of syrup* : Pack the slices into plain cans, add boiling hot syrup of 40° Brix leaving ¼″—½″ head space at the top.
4. *Exhausting* : Exhaust the cans half dipped in boiling water for 7-10 minutes till the centre of the cans reaches a temperature of 175°F Seal the cans air-tight with a can sealer.
5. *Sterilization and Storage* : Sterilize the cans in boiling water for 15 minutes. Cool the cans to room temperature. Wipe dry and store in a cool dry place.

CANNING OF TOMATOES

1. *Selection of vegetable* : Select fresh, firm, ripe, round smooth tomatoes of deep red colour and medium in size. Blemished corrugated tomatoes of uneven maturity and colour are sorted out.
2. *Preparation of vegetable* : Wash the tomatoes well in running water to remove dust etc. Put the tomatoes in muslin cloth and immerse them in boiling water for one to two minutes till the skin reptures. Plunge the tomatoes in cold water to prevent softening. Peel off the skin from blossom end to stem end. During preparation keep the tomatoes in shallow pans to avoid crushing.
3. *Filling and exhausting* : Pack the whole or cored tomatoes into plain cans as tightly as possible. Add 2 spoonful of sugar and about ten

spoonful of salt per 2 lb. can or fill with plain or salted tomato juice received from smashed and crushed tomatoes, leaving ¼″ head space at the top. Exhaust the cans half dipped in boiling water for 10 minutes and seal them air-tight. The sealed cans (A2½) are sterilised for 40 minutes at 212°F. Cool dry and store in cool dry place.

CANNING OF PEAS

1. *Selection of vegetables* : Select fresh, matured, green peas of good canning variety, such as Marrow-fat, Type 17, 19, 193 etc. Peas are graded for size and maturity.
2. *Preparation and filling of vegetables* : Peas are shelled with hand or podding machine. Peas are graded for size and maturity. Blanch the grains in boiling water. It helps to improve the colour texture of the grains. Fill the cans with grains and add boiling hot brine of 2% salt and 4% sugar, leaving ¼″—½″ head space at the top.
3. *Exhausting* : Exhaust the cans half dipped in boiling water for 7—10 minutes, till the centre of the can reaches a temperature of 190°F. Seal the cans air-tight with a can Sealer.
4. *Sterilization and Storage* : Sterilize the sealed cans (A2½) in Pressure Cooker at 10 lb. pressure *i.e.* 240°F for 40 minutes. Cool the cans immediately in running water. Wipe dry and store in cool dry place.

Name of Equipment Required

	Cost
1. Can sealer—one	450·00
2. Crown Corking Machine—Two	70·00
3. Screwtype juice extracting Machine Two	80·00
4. Basket press—one	100·00
5. Pressure cooker (25 Quart)—one	350·00
6. Stoves primus No. 2—four	300·00
7. Stove primus No. 100—one	40·00
8. Stove primus No. 3—one	100·00
9. Aluminium or stainless steel, Patilas of different sizes—12	250·00
10. Aluminium Basins—six	50·00
11. Aluminium Mugs—six	10·00
12. Balance (Avery) to weigh 281 lbs.—one	200·00
13. Chemical balance small	10·00
14. Lime squeezers—four	5·00
15. Vegetable graders—two	5·00
16. Pint Measures—two	10·00
17. Measuring glasses—two	2·00
18. Thermometer (F)—four	20·00
19. Jelmeter—one	20·00
20. Peeling, cutting and pitting knives—2 dozen stainless	24·00
21. Working table—four	200·00
22. Buckets stainless steel—four	150·00
23. Buckets iron—four	15·00

24. Teaspoons, plates and forks	50·00
25. Glass, Jars and carboys—12	100·00
26. Jelly bag—one	30·00
27. Aluminium sieves—two	25·00
28. Pestal and Morter (Iron)—one	6·00
29. Pestal and Morter (Porcelain)	5·00
30. Wooden jelly-press—two	5·00
31. Wooden laddles—two	5·00
32. Big metal spoons—six	10·00
33. Brix Hydrometer—one set	60·00
34. Glass cylinder (1500 c.c. 1 25 c.c.)	5·00
35. Enamelled funnels—four	10·00
36. Iron Drums (for water)—two	40·00
37. Almirah wooden—2	300·00
38. Steel Almirah—one	180·00
39. Time piece—one	30·00
40. Kilner Jars—two dozens	75·00
41. Office furniture	300·00
42. Earthern Jars	100·00
43. Bottle washing brushes—one dozen	10·00
44. Can and cork openers—Four	3·00
45. Iron Karahi—one	3·00
46. Rubber Gloves—six	15·00

CANE AND BAMBOO WORK

Syllabus for Training of Rural Artisans in the Trade of Cane and Bamboo Works for One Year

Month	Hours	Details
First	20	*Theory*—Study of Cane and Bamboo work in early times in India and other countries. General information about Cane and Bamboo. Their utility and prices. Information about tools for Cane and Bamboo work. Their uses and prices. Selection of Bamboo and Cane useful for different articles.
	20	*Drawing.*—Cane and Bamboo material and instruments. Articles in the practicals given below.
	92	*Practical.*—Breaking of the Cane and Bamboo, splitting the Cane and Bamboo. *Exercise No. 1.* Preparing Cane and Bamboo strips of different sizes. Simple articles on wood base—such as Glass holders, pin cushion, Bamboo strip basket.
Second	16	*Theory.*—How to prepare tar Cane Gabha Cane from Cane and strips from Bamboo. Their utility. Theory of the basic principles of Cane and Bamboo work—such as weaves and borders. Hints for beginners enclosed.
	20	*Drawing.*—Method of weaves and border. Articles given below in practical.
	96	*Practical.*—Walking stick, hanger, Bamboo mat. Various types of borders samples. Table mat.
Third	16	*Theory.*—Higher tools. Information about the utilitarian value of the Cane and Bamboo articles. Information about different types of handles in Cane and Bamboo. Different kinds of bases.
	20	*Drawing.*—Higher tools—drawing. Different kinds of handles and bases. Practical work articles given below.
	96	*Practical.*—Bamboo : small basket, Fan and batwa. Cane and Bamboo: Handles—samples. Cane : Fruit dish. Cane and Bamboo : Waste paper basket full weave.
Fourth	12	*Theory.*—Information about wood in Cane work. Colouring of Cane and Bamboo. Preservation of Cane and Bamboo. Method of teaching Cane and Bamboo articles.
	20	*Drawing.*—Practical work articles given below.
	100	*Practical.*—Flower basket Bamboo. Round Tray with wooden base. Square tray—plated borders. Flower basket—cane.

Month	Hours	Details
Fifth	12	*Theory.*—Upkeep of finished articles and instruments. Calculation of the cost of finished articles.
	20	*Drawing.*—Practical work articles.
	100	*Practical.*—Round box—Cane. Mango basket—Bamboo. Picnic bag—Gabha Cane. Mats (small)—Bamboo. Hanging flower pot—Cane.
Sixth	8	*Theory.*—Repairs to articles. Lectures on marketing.
	24	*Drawing.*—Practicals :—Articles of 3 kinds of chair weaves.
	100	*Practical.*—Office tray, market bag (both cane). Chair weaves—3 kinds. Bamboo book stand.
Seventh	8	*Theory.*—Lectures on Handicrafts and their development. Different seat weaves.
	24	*Drawing.*—Weaves of chair seats. Full weaves and practical work articles.
	100	*Practical.*—Chair Seats in full weaves and other two weaves. Square or round stool. Laundry basket in Bamboo.
Eighth	8	*Theory.*—Teaching methods and human relations. Importance of design.
	24	*Drawing.*—Baby chair in cane and winnowing fan in Bamboo. Flower pots in Bamboo and Gabha Cane.
	100	*Practical.*—Articles given in Drawing. Baby Chair, Winnowing fan, flower pot. Lamp shade.
Ninth	8	*Theory.*—Industrial co-operatives. Repair to articles. Polishing of cane.
	24	*Drawing.*—Lamp stand, Lamp shade, Sofa set.
	100	*Practical.*—Sofa set. Lamp shade.
Tenth	16	*Theory.*—Lectures on pricing and accounts.
	25	*Drawing.*—Garden chair, Lamp stand, Boxes.
	96	*Practical.*—Garden chair, Lamp stand, Boxes.
Eleventh	20	*Theory.*—Lectures on Lacquer work in Bamboo and Cane. Revision. How to solve question and difficulties.
	20	*Drawing.*—New designs in Cane and Bamboo—such as small bags, hats, different batwas, lamp shades, etc.
	80	*Practical.*—Articles in drawing. Bamboo and Cane bags, hats, etc.

8 *days for examination*

HINTS AND GENERAL INSTRUCTIONS

Hints for Beginners

The following hints are the outcome of the experience of many years of practical basket making and teaching of basket work.

1. Reed must never be worked dry, for it will crack. Pass it through water and allow it to drain a few minutes before using it. Have a wet cloth or sponge at hand to dampen the reed as it becomes dry during the working.

2. The first articles made should have a wooden base, as a firm foundation is easier for a beginner than is a flexible one. Not until the worker has become accustomed to using the reed should attempt weaving a reed base.

For school use, birch are recommended in preference to oak, as the former are less expensive. All the bases with the exception of the tray are of, 3 ply birch, ⅛″ to 3/16″ thick, and termed learners on beginners bases. The tray, being larger, requires a thicker 3 ply base, preferably ¼ birch.

3. Generally speaking, the steps in making a basket with a wooden base are as follows :—

- (a) Cut the stake (or spokes) and insert them in the base;
- (b) Work to ends under the base into a border, called a foot border;
- (c) Upset and weave the sides;
- (d) Work the remainder of the stakes into a border for the top edge of the basket;
- (e) Attach a handle, if one is desired.

4. For good results it is essential to work in a comfortable position. Trays can be worked on a flat surface, such as the top of the desk, but for baskets a work border with a sloping surface should be used. This can be made very easily in a craft shop. It consists of two pieces of wood, one 12″ by 3″ the other 5″ by 8″ nailed together, and used on a desk or a table. The raised end faces the worker and the basket is pinned through the centre of the base to the sloping board with a small awl, with the edge of the base along the front edge of the board. In this position the basket can be revolved easily during the weaving and any mistakes can be quickly seen and corrected at once.

5. The weaving is generally worked from left to right and on the side of the basket near the worker, not on the far side, each stroke should be held in position with the left thumb and forefinger, while the next stroke is worked with the right hand. Keeping the weaving close and firm, do not allow it to get at all 'Cobwebby' in appearance. It is not necessary however to pull the reed tight. Nor is it necessary to grip the reed too firmly. Beginners often have the tendency to grasp the reed strands too tightly, which causes cramped and tired fingers.

6. The stakes, or spokes, which are the upright on foundation, reeds of a basket, should always be somewhat larger in diameter then the weaving reeds (or "weavers"). They are spaced at regular intervals and must be kept upright, not pulled forward, during the weaving.

7. In storing unfinished work, do not allow the stakes to be pressed out of shape. Before resuming the weaving, moisten the uprights but take care that the wooden base does not become water soaked, and thus lessen the value of the finished basket.

8. Do not use a very long piece of reed for weaving. A length should not exceed 3 yards, for it is a simple matter to join reeds as described.

9. When the work is finished, cut off with a slanting cut any protruding ends, so that the ends are flusn with the work. To make sure of this, rub the hand over the basket to see if it feels quite smooth. Do not cut the ends too close however each end should rest securely against a stake.

10. The appearance of the work is greatly improved if the protruding 'whiskers' or thin fibres of the reed are signed off with a Bunsen gas burner, or a methylated spirit lamp. Do not use a taper, as it will blacken the reed.

11. The way reed is stored before it is used is important. The lengths should be as straight as possible if good work is to be done, so that it is not advisable to keep it tightly coiled in a cupboard. The reed is supplied in bundles, all the lengths being bent in half for convenience and measuring approximately 10 feet from the bent, making the total lengths 14′ to 20′. These are, of course, too long to be practical, for, as previously mentioned the lengths should not exceed 3 yards. As it is almost impossible to straighten the bent part of the reeds, it is advisable to cut this portion from the entire bundle for a depth of 1″. The reed will then be in suitable lengths for use, and the benefit derived in avoiding the 'bends' will be well worth the small waste incurred. Therefore, the shorter length is much more convenient for storing. The ideal method of storing reed is to lay it flat in long racks, but often in a school room this is not possible. The next best way is to hand it up. Bend it not with an acute bend, but a broad loop, end tie it together with a string or raffia about 12″ down. Then it can be hung on some convenient peg or nail, and when not in use can be covered over with a cloth to keep it clean. It should not be placed near hot water or steam pipes, as this will make it brittle and thus likely to break easily.

12. All spokes and reeds soaked thoroughly in warm water before being used to render them pliable and prevent their breaking and splitting. They must be kept moist while being worked, for the same reason. The time required for the preliminary soaking varies with the size of the reed—from ten minutes for the finest reed to one-half hour or perhaps longer, for the coarser reeds. Reed should not be soaked so long it becomes fibrous. While working moisten the weave, or weaving lengths, with a sponge or cloth, as they dry out. They should always be pliant enough to weave smoothly.

13. Cut round reeds on a slent when using them as spokes or as weave or when finishing off in a border—for two reasons; they slip into place more easily and give a neater appearance to the finished article.

14. The length of spokes to be used in wooden bases must include the 2″ that is needed to form the base border, plus the length necessary for a specific border treatment, in addition to the length for the height and the slope of the basket. The spokes are inserted through the holes in the base, the ends extending about 2″. A slight twisting motion on the spoke will aid in the inserting operation. The spokes are left protruding through the base until the decorative edge operation is completed.

GENERAL INFORMATION ABOUT CANE

Cane palm are climbing plants which trail along the ground or climb the trees in the jungle and swamps of tropical countries.

The best canes come from the Straits Settlements, Sarawak, Java, Sumatra, Borneo, Celebes. They belong to the Genera Calamus, Daemonorops, etc. and grow to the great length of 200 ft. to 600 ft. an example at Kew measures 584 ft. The average diameter is under 1 in. and rarely gets beyond 1½ in. The leaves are only found at the end of the shoots.

The plants are erect when small and remain so until they attain the height of several feet, after which the stem needs support, which it receives from the aid of a long feeler or flagllum armed with hooked thorns, by means of which it clings to the vegetation.

Cane is rarely cultivated and usually grows in a wild state but some attempt at cultivation has been made in the Strait Settlements. The natives sever the branches with a small axe, their hands encased with thick hide gloves to protect them from the thorns. Then canes are cut into pieces. After the canes are cut into lengths from 12 ft. to 30 ft., they are fixed up in bundles and taken down the river to the godown, or native warehouse and then shipped to Singapore, where they are graded into their various sizes and qualities, and are sold to agents who dispatch them mainly to China, America, Germany, Holland and also to France and England. Pulp cane is made from the first qualities of cane called 'Segas' a fine glossy surfaced cane also known to the trade as Sarawak. This produces the best pulp cane on account of its pliability and good colour. The term 'Pulp' is misleading, as it is the centre or core of the 'rattan', which is very tough and fibrous and not at all pulpy.

The process of making pulp cane is as follows :—

First the selected canes are washed so as to bring out to its best advantage the beauty of the silicated surface. Then the leaf ridges of 'shots' as they are called are smoothed down and the cane is passed through a machine with rollers, which presses the cane against knives. The knives split and strip the outer surface of the cane into fine narrow strips, which are planed on the back and sides and this is used for the weaving of bedroom chair seats, etc.

The cane core is again put through another machine and split into various sizes. These will vary according to the size of the holes in the knives and thickness required and will range from less than 1 mm to 18 mm in diameter. Other machines cut or split the cane into various shapes, such as squares, half round, flat or levelled. The highest grade of cane splitting is done in Germany and America but is also split in France, Holland, Italy, and to a small extent in England.

The Chinese pulp cane is mostly made by hand and is very rough and poor in quality—the outer rough, glossy strands are used for covering ginger jars, and coarser kinds for other purposes.

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The chinese still make chair seating cane by hand, but the quality is usually poor. The solid roots of the cane which resemble those of bamboo, are made into polo balls and mallets as they are lighter than wood and owing to the knotted grain will not split easily.

There are very many varieties of the cane palm. Sixty are recorded by the Government Forestry Department, Kuala Lumpur. Straits Settlements and about three hundred species are known.

Cane is also found in West Africa and other tropical countries, and is used by the natives for rough basket work. A missionary on the Cargo recently showed some photographs of well designed chairs made by trained native labour from materials growing in the neighbourhood. African cane generally is of low quality with rough outer surface not-glossy and have coarse grain.

LIST OF TOOLS AND EQUIPMENT REQUIRED

Round Nosed Pliers	For Squeezing or bruising the stakes so that they can be bent for bordering at an acute angle without cracking.
Shears.	For cutting a number of stakes together and for cutting off the ends inside a basket. In some places this is preferable to using a knife.
Small Bodkin	to make the necessary space for inserting stakes into a cane base or for threading the ends of border canes etc.
Sharp knife.	Essential for cutting off ends and for pointing stakes etc.
Bent Bodkin.	A very useful tool for making the necessary space in a basket for inserting a handle.
Bradawl.	For pegging a cane base to a board so that it can be turned round freely.
Rapping Iron.	To tap the rows of weaving to make the work quite level.
Screw block.	For folding the stakes rigid in making the rectangular base.
Singeing lamp.	For removing the thin fibres of cane from finished work.
Big knife.	For cleaning joints of cane.
Saw.	To cut cane into pieces.
Sloping work board.	For advantage in working.
Flat nosed pliers.	Is used for holding gabha.
Pincers	For plucking nails.
Steel Ruler	For measuring dimensions.
Hammer	For hammering.
Splitting machine	To split gabha etc.
Drilling machine	To make holes.

SYLLABUS FOR BRICK AND TILE MAKING

Length of Training Period 38 weeks, (October to June).

NOTES

1. The students should have some idea of brick and tile making before commencement of any practical work. For the purpose, during the early stages of training the trainees should be released from all practical works by arrangement between Specialized Teacher and Craft Demonstrator or Instructor for at least two weeks period to acquire sufficient theoretical knowledge for practical performance.

2. During the early period the theoretical classes should not be more than two hours duration and not more than two classes a day. There should be at least eight classes a week. During this period the subjects of teaching should be general and covering the whole aspect of brick and tile making. At the close of the second week the Specialised Teacher (may himself be the Demonstrator or Instructor) should test the knowledge of the trainees to see that they have acquired fair knowledge of brick & tile making.

3. In the theoretical classes the Teacher should illustrate as far as possible the different operations and processes by means of models, drawings in blue prints and free hand sketches on black boards. The teacher should set tests to check the trainees progress at the end of 4/5 weekly period in training and maintain records of the progress of each trainee.

4. The Teacher will be responsible for teaching of the theories and practices, in the brick & tile making and should ensure that the theory and practice taught are closely related to the practical work, so that the trainees do not feel any difficulty in undertaking duties of their crafts. He should encourage the trainees to take notes during theoretical classes.

5. The instructions during practical work should deal only with an aspect of the work that is being undertaken at that time. The Demonstrator should encourage the trainees to record correctly the experimental data and take notes of the instructions given. The Demonstrator should set tests to check the progress of the trainees at the end of one set of operations in the whole process of the craft and keep records of progress of individual trainees.

6. Lectures should, normally, not be longer than one hour duration and not more than five lectures a week.

Work sheds and equipments for practical training

1. Tile-Roofed Drying Shed.
2. Tile-Roofed Tile-kiln Shed.
3. One 6′ to 8′ diameter circular Tile-kiln (to be constructed by the demonstrator & trainees during training period).
4. Adequate space for construction of clamp kiln for brick burning.
5. Ordinary Indigenous balance and weights to weigh up to 2 mds.
6. One small indigenous balance and weights to weigh up to 200 gms.

7. Foot Scales—One Doz. (Depending upon the number of trainees,) say, 20.
8. Wooden moulds for bricks—Two doz. (do.).
9. Wooden moulds for plain tile—Two doz. (do.)
10. Wooden moulds for Pan tile—Two doz. (do.)
11. Wooden moulds for Inter locking Tile—2 Pairs.
12. Wooden trowels and beaters for brick & Tile moulding—One doz. each (do.)
13. 60 mesh sieves—Two doz. (do.).
14. Galvanized buckets or tin cans of different sizes—1 doz. (do.).
15. Wooden trays for brick drying—4 doz. (do.).
16. Wooden trays for tile drying—16 doz. (do.)
17. Earthen ware vat of about 30" diameter for Glaze dipping—half doz.
18. Cane baskets—4 doz. (do.).
19. Trowels & Shovels for unsoiling and digging—One doz. each.
20. Hammers, Hacksaw blades, chisels, files etc.
21. Other items—depends on the Demonstrator.

Week	Details of practical work	Drawing No.	Demonstration & Instruction	Theoretical Lectures
(1)	(2)	(3)	(4)	(5)
1st & 2nd.	(Off)	—	—	(1) *General Principles of brick and Tile making with brief description of :* (*i*) Patterns of roofing tiles, shapes and sizes of bricks and tiles, characteristics of bricks and tiles (strength, water absorption, colour, ring etc.), (*ii*) Materials used and their preparation, (*iii*) Tempering with water, (*iv*) Hand moulding,

				(*v*) Drying, (*vi*) Kilns, (*vii*) Setting & burning, (*viii*) Sorting & selection, (*ix*) Setting of bricks in the construction, importance of frog hole in relation to morter etc. and setting of tiles in roofs etc. etc. Sixteen lectures; test after the courses of lecture.
3rd & 4th	(1) Acquaintance with different qualities of bricks and different designs of tiles. Measurement of dimensions of bricks and Tiles. (2) Free hand sketch drawing of bricks and tiles with dimensions.	Drawing No. 1. Fig. 1 Fig. 10 Fig. 2 Fig. 11 Fig. 3 Fig. 12 Fig. 4 Fig. 13 Fig. 5 Fig. 14 Fig. 6 Fig. 15	(1) Demonstrate the use of scale for measurement. (2) Give detail note on the dimensions of various bricks and tiles and also of the moulds.	(2) Describe different patterns of roofing tiles (*i*) Pantile (*ii*) Plain tile (*iii*) inter locking tile and different qualities of bricks. Discuss the advantages and disadvantages of different designs. Give an idea of the requirements of vitrified roofing tile and well burnt bricks (Strength, shape, colour, ring, water absorption etc.)
	(3) Acquaintance with brick and tile moulds. Measurement of dimensions of the different parts of the moulds.	Fig. 7 Fig 16 Fig. 8 Fig. 17 Fig. 9	(3) Demonstrate how to draw free hand geometrical drawing with dimensions.	Two lectures of one hour duration.
	(4) Free hand sketch drawing of moulds with dimensions.		(4) Demonstrate and explain why moulds are bigger in size than that of the burnt bricks and tiles.	(3) Give an idea of the nature and characteristics of different kinds of soils, such as, malms, marls, loams, shales, brick clay, tile clay etc. Give an idea of the amount of actual clay substance and the amount of non-clay substances present in these clays.
			(5) Instruct and give note on how to calculate percentage shrinkage and how to utilize this value in designing moulds.	Nature and amount of different impurities present in clays (free sand, iron bearing minerals, alkaline earths, soluble salts etc.) and their effect on plasticity, colour, vitrification, strength, water absorption, bloating, scumming etc. Discuss the characteristics of clay required to obtain well burnt bricks and good quality vitrified tiles

(1)	(2)	(3)	(4)	(5)
5th.	(1) Determination of the quality of bricks and tiles from their weight, colour, water absorption, ring, strength and distortion.		(1) Demonstrate how to test these characteristics.	(Plasticity, drying and firing shrinkage, vitrification, water absorption etc.). Explain what is understood by the term plasticity and how to determine it. Explain its importance in hand moulding, drying & firing of tiles and bricks. Describe the experimental method of determining the effects. Give an idea of how to increase or decrease plasticity. Explain the addition of fine sand or sandy clay in controlling plasticity. Describe the experimental method of determining the effect. (4) Give a general idea of the preparation of clay prior to moulding and explain why this is necessary. (*i*) Proper mixing of materials. (*ii*) absence of undesirable ingradients. (*iii*) absence of hard lumps and stones or uncrushable materials. (*iv*) presence in the clay paste of a proper proportion of water for desirable workability. One lecture. (5) *Give a general idea of the methods of unsoiling and clay digging.*–Describe in detailed particulars, methods to be adopted by the trainees, of removing over burden and digging of clay, methods of removing impurities etc. Three lectures.
6th.	(*i*) Unsoiling or removing of over burden from a selected site. Collection of samples from different depths of the same plot. Removing visible impurities etc. Mixing and quartering to obtain average sample. Collection		Demonstrate the techniques of unsoiling, collection of samples, making of average sample by quartering. Instruct how to give identification mark on each sample.	(1) *Give a general idea of tempering clay with water*, weathering, *kneading*, *scouring of clay pastes.* Three lectures.

	of samples from different plots. Designing each samples with identification mark such as A, B, C, D, etc. on plot basis.		
7th to 11th	Testing the nature of clay samples collected :	Demonstrate :	(1) *Preparation of the materials for hand moulding:*
	(1) Tempering clay samples with water to obtain desired plasticity for hand moulding.	(1) how to temper clay with water to get desired plasticity,	(*i*) Explain the significance of tempering of clay with water in relation to workability of clay paste in hand moulding. Give details of the method of tempering.
	(2) Making of small hand moulded briquettes of appx. 2″×2½″×1″ size. Mark each set of briquettes with particular identification mark corresponding to the clay sample.	(2) method of kneading of the tempered clay,	(*ii*) Explain the significance of weathering and its effect on plasticity & hand moulding of tiles. Discuss the changes taking place during weathering. Give the detail procedure of weathering.
	(3) Weighing the wet briquettes. (4) Measuring the length of the briquettes under wet condition.	(3) making of briquettes, (4) marking of briquettes with identification mark,	(*iii*) Explain what is kneading and discuss its significance in hand moulding of tiles. Describe kneading process and compare with pugging. Discuss the advantages and disadvantages of kneading.
	(5) Allowing them to dry in air for at least seven days under shade and then 3 days in sun. With occasional turning them on different faces. (6) Weighing the dry briquettes and determine percentage of water that was present in those briquettes, *i.e.*, percentage water of plasticity.	(5) methods of weighing drying, measuring and calculation of water of plasticity and shrinkage. Explain each stage of operation.	(*iv*) Explain what is scouring and its effect on workability of clay paste for hand moulding of tiles.
	(7) Measuring the length of the dry briquettes and calculate percentage dry shrinkage.		
	(8) Preparing at least 6 briquettes from each sample of clay.		

(1)	(2)	(3)	(4)	(5)
	Note:— (*i*) If the water of plasticity is more than 25% and drying shrinkage more than 6% and if the colour is gray the clay sample is suitable for tile making. Two different varieties of clay or fine sand or sandy clay will have to be mixed together before actual hand moulding of tiles. (*ii*) If the water of plasticity is below 20%, shrinkage below 4% and colour yellowish the clay is meant for brick making only.		(1) Demonstrate the use of sieve. (2) Instruct and inspect that the operation in the determination of plasticity and shrinkage are correctly done. Demonstrate if necessary. (3) Instruct on the use of balance during mixing of different varieties of clays or sand or sandy clay to have an idea of correct weight proportions in the mix.	(*v*) Explain the basis and importance of mixing different varieties of clays, sand and sandy soil in controlling the characteristics of clay paste in moulding of bricks and tiles. Give an idea of the proportion of sand or sandy clay usually mixed with plastic clay before tempering with water. *Twelve lectures.* *Note.*—Preparation of clay in relation to moulding is very very important and hence the trainees should be given a very clear picture of the whole process. Demonstrate wherever possible and illustrate the significance.
12th to 16th	(9) To the plastic clay (water of plasticity more than 25%, shrinkage more than 6%) add known quantity of another less plastic variety of clay or 10 to 15% of fine sand or sandy clay. The sand or sandy clay will have to be sieved through 60 mesh sieve before use. After addition of sand or sandy clay repeat the previous operations to determine water of plasticity and drying shrinkage. *Note:*— (*i*) For tile making the water of plasticity of the mixture should be at least 20% and drying shrinkage between 3 to 4%. For bricks these values may be in the lower range.			(1) *Moulding of bricks and tiles:*— (*i*) Explain what is understood by moulding or shaping and describe different methods of moulding of bricks and tiles *i.e.* sand moulding, slop moulding, dry pressing etc. (*ii*) Give an idea of the water content of the clay paste in different types of moulding and its importance. (*iii*) Explain the function of sand in case of sand moulding and describe the method of moulding. (*iv*) Describe slop moulding and explain its advantages and disadvantages. (*v*) Describe in brief the pressing of tiles in tile press using wooden die and steel die.

	(*ii*) Repeat all the operations several times to acquire sufficient skill for independent work. (*iii*) Record all the data in practical note book for future reference. (This tedious method of determining water of plasticity and drying shrinkage is essential for those who have no idea of the craft. By repeated performance of the operations they will acquire sufficient skill to understand the characteristics of clays by simply tampering it with water and handfeel method. The laboratory method won't be necessary then. The demonstrator must test that the trainees have acquired that much of skill).		Use of sand & kerosine oil for mould release. (*vi*) Describe the technique of transfering bricks and tiles from moulds on the drying trays. (*vii*) Give an idea of the design of the wooden drying trays and the significance of design in relation to drying of tiles. Twenty lectures. *Note.*—Demonstrate wherever possible to give clear picture of the operations.
17th to 21st.	Clay unsoiling, digging and preparation: (*i*) Removal of over burden of the plot of land before digging.	Demonstrate the technique of removal of over burden and digging operation.	(1) *Drying & glazing :* (*i*) Give a fairly general idea of the mechanism of drying.
	(*ii*) Digging of clay. (*iii*) Stacking of clay very close to the moulding place. Different qualities of clay should be stacked separately with proper identification mark.	Instruct how to stack the clay and how to put identification mark on each stack.	(*ii*) Explain the importance of atmospheric conditions and time of drying particularly in relation to thickness and shape of tiles and bricks, and also on the characteristics of the clay. Explain the warping tendency in tiles and how to avoid it. Cares to be taken during drying in closed space and in open space.
	(*iv*) For tile making, mix required proportion of different varieties of clays, fine sand and sandy clay. (The proportion of each quality of clay and sand will depend upon the	Instruct on the use of balance to obtain correct weight ratio of the mixture and on the method of mixing.	(*iii*) Explain the importance of drying shed for tiles and the arrangement of tiles in the drying shed (space between tiles the circulation of air). Give an idea of the usual time taken for complete drying of bricks & tiles.

(1)	(2)	(3)	(4)	(5)
	results obtained in small scale experiment).			(iv) Give an idea of the characteristics of the tile colour clay used for glazing or colouring of tiles. Explain the advantage of using it.
	(v) Removal of impurities, such as, root, ends, hard lumps, stones etc., before the mixture is ready for tempering with water.			(v) Describe the methods of application of tile colour clay. Give an idea of the amounts of water in the slips for brushing and for dipping purposes, of the time of dipping of the tiles in glaze slip etc.
	(vi) Tampering of tile clay mixture with desired amount of water.		Instruct and see that the paste is properly tempered, studying plasticity by hand feel method.	(vi) Storage of dry green bricks and coloured tiles before firing.
	(vii) Manual kneading of tempered clay. The time of kneading depends on the amount and on the purpose. (Whether for bricks or for tiles).		Instruct on kneading operation and on time of kneading.	Twenty lectures.
	(viii) In case of tile clay weathering and scouring is necessary. For the purpose spread the kneaded clay in the form of beds of dimensions 1′×4′×6′ and allow it to weather for atleast six days before using for moulding. Cover the beds with wet hay stock. With occasional sprinkling of water to moisten the beds. Brick clay does not require such weathering & scouring before moulding operation.		Instruct on spreading of clay paste and covering the beds for weathering purpose.	
22nd to 27th	(1) *Brick mouldings*: (i) Joining of the different parts of the brick moulds. (ii) Preparing sufficient quantity of sieved dry sand or sandy clay.			(1) *Effect of heat on clay*:—Explain in details what happens when clays in the form of brick and tiles are heated from atmospheric temperature to 1000° C. (i) Describe the first stage of transformation *i.e.*, between 20° C to 150° C, gradual removal,

			of still adhering water, formation of porosity & slight shrinkage etc. Precautions to be taken during this water smoking period, controlling temperature and time. Give an idea of the time required for this period. Discuss the defects that may arise due to rapid heating at this stage. (usual practice in India).
(*iii*) Spreading of dry sand on the inside surface of the moulds. (*iv*) Batting of clay paste into an approximate shape of a brick, throwing of bat into the mould, beating the paste into the mould to get perfect shape, removing of excess, tilting of the mould & brick upon the drying tray or plate, carefully releasing the mould from the soft brick resting on the tray without distortion.			
(*v*) Placing of drying trays in the drying shade after the trays are full of bricks.			(*ii*) Describe the second stage of transformation *i.e.*, between 150° to 500° C. Oxidation of organic and other oxidizable substance. Formation of bloat (swelled surface with vascular structure within) and black core (dark spots on the surface or in the bulk). Explain the reasons for their formation and how to avoid them by controlling heating rate and air supply. Approximate time of heating at this stage.
(2) *Tile moulding* (*Plain tile*) (*i*) Repeating the first three operations of brick moulding using tile moulds. (*ii*) Making of bat of approximate shape of a tile of almost equal dimension of that of the mould, throwing of bat on the mould, pressing with top part of the mould to get the desired shape, removing the top part of the mould, placing the drying tray on the top of the mould and tilting the whole setting such that the tile rests comfortably on the tray, releasing the mould carefully without distorting the tile.	Drawing No. 2 Fig.-1. Fig.-2.	Demonstrate in minute details the moulding of tiles.	(*iii*) Describe third stage of transformation *i.e.*, between 500° to 1000° C. Decomposition of minerals, partial fusion of some substances, sintering of particles, filling up of pores by fused flux etc. Explain vitrification range and give an idea of the desired vitrification range of bricks & tiles. Explain how vitrification range is affected by the nature of the flux. Control of temperature and time. Approximate time of full fire period. **Ten lectures.**

(1)	(2)	(3)	(4)	(5)
	(*iii*) Placing of drying trays in the drying shade.			*KILNS & FUELS*
	(3) *Drying of bricks & tiles* (*i*) Arranging brick and tile trays in such a way that there is sufficient space between two bricks or two tiles and also between successive layers for circulation of air essential for thorough and uniform drying.		Instruct how to arrange the trays to get all the advantages of drying.	(1) *Give a general introduction on the different types of kiln with particular reference on :* (*a*) Clamp for bricks. (*b*) Strength kiln for bricks. (*c*) Up draught tile kiln. (*d*) Up draught & down draught permanent kilns.
	(*ii*) Allowing the bricks to dry for 4 days inside the shed, first day resting on 10″×5″ face, second day resting on opposite 10″×5″ face, third day resting on 10″×3″ face and fourth day resting on another 10″×3″ face. After fourth day of drying these may be placed under sun for thorough drying.			Give detailed description of the clamp kiln and the up draught circular tile kiln. Give an idea of the construction of fire boxes & holes, channels etc., setting of bricks and construction of walls of the kilns etc., distribution of heat and how to control the distribution of heat by coal charging and controlling fire holes etc.
	(*iii*) Allowing the tiles to dry in the shade for minimum of six days, first three days resting on one face and next three days resting on opposite face. After six days of drying the tiles are ready for colouring or glazing.			(2) Give an idea of the different types of fuels used for brick and tile burning *i.e.*, wood, slack coal, lump coal; meaning of heating value of fuel and relative heating value of these fuels. Explain how heating value is affected by the presence of moisture and ash etc., relative cost of different fuels and amount of fuel required for complete firing of 1,000 bricks or tiles.
	(4) Preparing of tile colour clay (available in the market) suspension in a 30″ diameter 12″ deep earthenware vat. Deiping of dry tile completely into the suspension for a few seconds, raising it and allowing it to dry out in air. Finally arranging the coloured tiles in drying shades.		Demonstrate how to prepare tile colour clay suspension and colouring the tiles by deiping.	Ten lectures.

27th to 38th.	(1) *Construction of tile kiln according to the drawing supplied.* (*i*) Levelling of the ground (*ii*) Digging central fire hole and ash pit.	Drawing No. 3	Instruct and help the trainees to construct the kiln. *Note.*—Modify the construction according to your own choice and preference.	(1) *Setting of bricks and tiles* (*i*) Describe in detail the arrangement of bricks in clamp kiln with desired spacing of bricks in different courses, addition of slack and lump coal in different quantities in different setting, arrangement of fire holes, construction of temporary wall and covering the kiln etc.
	(*iii*) Placing of fire bars on the fire box. (*iv*) Construction of Channels with arch through which coal is to be charged. (*v*) Construction of checker wall. (*vi*) Placing of perforated dome over the checkered wall. (*vii*) Covering and levelling kiln floor.			(*ii*) Describe in detail the arrangement of tiles in tile kilns with coal and dry hay in desired places. Arrangement of bricks and tiles over the central arch arrangement of bricks to cover the space between, parallel rows of tiles etc., covering the setting with temporary wall and the whole arch with mud etc. (*iii*) Explain the importance of setting of bricks and tiles as described above in the light of air circulation, heat distribution, firing shrinkage, load bearing capacity etc.
	(*viii*) Construction of kiln wall with opening at desirable places. (*ix*) Finishing work. (*x*) Drying.			(2) *Burning of Bricks and tiles.*—Describe in detail the method of firing clamp kilns and tile kilns with particular reference to lighting up of the kilns, control of firing in the initial stage, control of air, control of intermediate stage of firing and final stage of firing, methods of coal charging and variation in the amount of coal and time interval to control fire etc. Give an idea of the total time and amount of coal or fuel required for complete firing of kilns of specified dimension. Describe how to lower the temperature and close down the kilns. Give an idea of the flame colour at full fire and how to know that the kilns have reached the desired temperature etc. Twenty lectures.
	(2) Preparation of the place for construction of clamp kiln for brick burning. (*i*) Levelling of the ground according to the desired slope. (*ii*) Placing of ground bricks. (*iii*) Setting of first few coarses of bricks with desired spacing and coal live holes in desired position, charging of slack and lump coal in the setting in each coarse in the layer.	Drawing No. 4 Fig-1. Fig-2. Fig-3.	Instruct and help in the construction of clamp kiln. Demonstrate the setting of bricks in coarses and layers. *Note:*—Discuss with minute detail the importance of setting in brick burning before actual setting work.	

(1)	(2)	(3)	(4)	(5)
	(*iv*) Setting up of next few coarses of bricks with holes at desired places and required amount of coal spreading. (*v*) Setting of third coarse of bricks and coal. (*vi*) Final Setting of bricks. (*vii*) Construction of covering wall. (*viii*) Covering the top with mud etc., with desired holes. (*ix*) Drying.			*Note.*—The success of brick and tile making depends almost entirely on the setting and burning operations. These are the most difficult operations in the process and requires thorough conception. Hence repeat the classes as many times as possible, give details as far practicable with necessary drawing and demonstrations. (3) *General Discussions.*—Analyse the defects in the practical performances of the trainees and discuss how to improve there upon.
	(3) Burning of clamp klin : (*i*) Lighting up of the big fire holes at one side and allow it to travel within the setting in nearly all possible direction. (*ii*) Allow sufficient time so that flames occupy sufficient space inside the setting and then close down the mouths of the fire holes and cover them. (*iii*) Allow the firing to continue itself without any disturbance from outside. If the setting is properly done the firing will be perfect by itself with sufficient number of well burnt bricks. The total firing and cooling period is about three to four weeks, It depends on the volume and compactness of the setting.		Demonstrate how to light-up the clamps and control fire during brick burning.	

Note.—For better burning it is wise to start firing at one end and allowing it to travel itself to the opposite end without interference.	
(*iv*) Control the air opening from time to time for proper burning of fuel and controlling the temperature.	
(*v*) After the fire has died down close all the holes for some time and then finally open all the holes to allow fresh air to get inside the setting for cooling.	
(*vi*) Break open and dismantle the setting carefully, sort out well burnt, unburnt and over burnt bricks and store them in different stocks.	
Note the percentage of well burnt bricks per firing.	
(4) Setting of tiles in the tile kiln (*i*) Paving the floor of the kiln. (*ii*) Arrangement of bricks and tiles on the top and around the central dome.	Demonstrate the setting of tiles in tile kiln with necessary details regarding spacing and fuel amount in different places.
(*iii*) Spreading of fuel	*Note.*—Discuss the importance of setting in tile burning before actual setting work.
(*iv*) Arrangement of tiles with necessary coal and dry hay stock in between tiles.	

(1)	(2)	(3)	(4)	(5)
	(*v*) Arrangement of green bricks to support the tiles and covering available space in the tile setting.			
	(*vi*) Construction of temporary brick wall circumscribing tile setting and final covering the whole setting with mud and other rubbish etc.			
	(*vii*) Drying.			
	(5) Burning of tiles:		Demonstrate Full firing of tiles.	
	(*i*) Charging of coal in the central fire box.			
	(*ii*) Initial Lighting up.			
	(*iii*) Controlling. different stages of firing by adjusting coal charging through the channels and time interval and air inlet through air holes.			
	(*iv*) Studying of temperature of the kiln at full fire stage.			
	(*v*) Gradual lowering of temperature and final closing down.			
	(*vi*) Cooling.			
	(*vii*) Opening up the kiln, dismantling the tile and brick setting, and sorting of different qualities of tiles and bricks. Note the percentage of first grade tile.			
	(6) Arrangement of burnt tiles in the storage, different qualities in different stacks.		Instruct how to arrange brick and tiles in stacks.	
	Note.—There should be at least two brick burning and four tile burning.			
				Methods of colouring the bricks and tiles.

L9CD&C/62

BAKERY & CONFECTIONERY

SYLLABUS FOR TRAINING OF RURAL ARTISANS IN BAKERY AND CONFECTIONERY

PERIOD OF TRAINING:—*ONE YEAR*

PREPARED BY SHRI H.S. DAY, PRINCIPAL, GOVERNMENT INDUSTRIES TRAINING INSTITUTE, JHARGARM DISTRICT MIDNAPORE (WEST BENGAL)

Theory	Shop Talk and Demonstration	Practical Work
1st Month		
1. Description of wood fired oven for baking of bread, biscuits, cakes etc.	1. Selection of materials required for making oven.	Practice in : (1) firing of oven.
2. Specifications of baking ovens.	2. Demonstration of : (*a*) Laying of bricks in foundation and baking chamber of the oven, (*b*) filling of foundation with sand, glass pieces and common salt.	(2) removing of ash from the oven after it has acquired the requisite temperature.
3. Materials required for constructing oven ..	3. Laying of fire bricks on the floor of baking chamber.	(3) Practice in weighing of materials for biscuits, making of dough for biscuits, cutting of flattening dough with biscuit cutters and baking and wrapping of biscuits.
4. Types of wood suitable for firing of oven and method of arranging the fire wood pieces on the floor of the baking chamber.	4. Arranging of fire wood pieces in the baking chamber.	
5. Process of making saltish biscuits.	5. Mixing of materials and making of dough for biscuits.	
6. Names of materials, tools and equipments required for making biscuits.		
2nd Month		
1. Method of making breads, buns and rusks ..	1. Demonstration and explanation of process of making (*a*) Yeast from 'Hop', (*b*) Bread dough, (*c*) baking and wrapping of breads.	Practice in : (1) making yeast from 'Hop.'
2. Materials required for making bread, buns and rusks.	2. Weighing of bread materials, making of bread dough, putting of dough in bread moulding boxes and baking of breads.	(2) Weighing of bread materials, making of bread dough, putting of dough in bread moulding boxes and baking of bread.

Theory	Shop Talk and Demonstration	Practical Work
2nd Month—contd.		
3. Method of making yeast from 'Hop', function of yeast and types of yeast available.		
4. Names and specifications of tools and equipments required for making Breads, buns and rusks.		
5. Popular shapes of Bread, buns and rusks and their weight.		
3rd & 4th Month		
1. Lecture on :		1. Practice in making :
(1) Wheat flour suitable for making breads, buns, rusks, biscuits, cakes and pasteries.	1. Selection of materials suitable for making different qualities of breads and biscuits.	(1) Breads, saltish and sweet biscuits Rusks, and Buns.
(2) Storing of materials.	2. Demonstration of working of machine for flatening of biscuits dough.	(2) Mixing of material for bread with the help of hand and power operated kneading machines.
(3) Slicing of breads.	3. Demonstration of working of manually operated and electrically operated machines for kneading of materials of breads.	(3) Flatening of biscuit dough with hand operated machine.
(4) Method of making sweet biscuits		
(5) Repair and maintenance of baking oven.		
Maintenance of tools and equipments employed in baking industry.		

Theory	Shop Talk and Demonstration	Practical Work
5th & 6th Month		
1. Description and specifications of tools and equipments required for making cakes and pastries.	Demonstration of : (1) Whisking of white of the eggs with whisk.	1. Practice in whisking of white of the eggs.
. Method of making cakes and pasteries ..	(2) Mixing of materials of cakes and pasteries.	2. Making and colouring of 'Icing sugar' 3. Making of cakes and pasteries different shapes and their decoration with 'Icing-sugar'.
3. Precautions to be taken in breaking eggs. ..	(3) Making of 'Icing Sugar'.	4. Making of bread, buns and biscuits.
4. Method of making 'Icing Sugar' used for decoration of cakes and pasteries.		
5. Lecture on decoration of cakes and pasteries with plain and colour 'Icing Sugar'.		
7th & 8th Month		
1. Method of decorating festival cakes.	(1) Demonstration of making syrup paste for lozenges, their shaping with presses and moulds.	1. Making of festival cakes.
Lozenges : Lecture on :		
2. Names and specifications of tools and equipments required for making lozenges.		2. Practice in : (1) Preparing of syrup paste for lozenges. (2) Colouring and flavouring of syrup paste. (3) Making of sweet-drops, lollypaps, chaina balls etc.
3. Materials required and method of making lozenges.		
4. Preservation and baking of lozenges.		
5. Trade names of essences and colours used confectionary articles.		
6. Popular shapes of lozenges. ..		

Theory	Shop Talk and Demonstration	Practical Work
9th Month		
Taffees and Chocolates		
Lecture on :		
1. Materials required for making toffees and chocolates.	Demonstration of making of toffees and chocolates.	1. Preparation of toffees and chocolates in different sweets.
2 Names and specifications of tools and equipments.		2. Practice in wraping of toffees and Chocolates in butter paper, cellophenen and artistic paper.
3 Types of coco powder suitable for making toffees and chocolates.		
4. Method of making toffees and chocolates		
5. Kinds of papers suitable for wraping of toffees and chocolates.		
10th Month		
Sweets :		
	Demonstration of—	
1. Materials required for making fancy sweets ..	1. Making of 'Khoa' and mixing it with sugar and coconut powder.	
2. Names and specifications of tools and equipments required for making sweets.		
3. Process of making fancy sweets of different kinds including sugar coated dry fruits.	2. Colouring and flavouring of materials for sweets.	Practice in :
4. Colouring and decoration of sweets	3. Making and cutting of sweets in different shapes.	Making of fancy sweets in different colours and shapes out of mixture of 'Khoa' (prepared by boiling milk), Sugar and dry hydronated coconut.
5. Method of coating dry fruits with sugar	..	2. Decorating of sweets with icing sugar.
		3. Coating of dry fruits such as almonds, cashew nuts, dates with sugar.

Theory	Shop Talk and Demonstration	Practical Work
11th Month		
Checking and correcting of notes taken by the trainees in the class room		Practice in making of breads, buns, rusks biscuits, cakes, pastries, lozenges, toffees. chocolates and fancy sweets.
12th Month		
Examination in theory		*Examination in Practical work* Every student will be required to make himself a few pieces of breads, biscuits, buns, rusks, decorated cakes and pastries, lozenges, toffees, chocolates, and fancy sweets.

SHORT LESSON NOTES ON BAKERY AND CONFECTIONERY

Bakery

Bakery articles such as bread, buns, biscuits, cakes etc. are baked in a "Baking Oven". Size of the oven depends on the quantity and type of bakery articles required to be baked in one working hour.

Baking Oven

Oven for baking breads, biscuits, cakes etc. consists of a chamber having a chimney on its top side for the outlet of smoke and to provide the requisite draught for burning of fire wood in the baking chamber. The floor of the chamber which forms the grate of the oven is flat in shape and is constructed by laying fire clay bricks side by side without any mortar in between them. Top side of the chamber is of hemi-spherical shape.

The four walls of the foundation and plinth as well as the baking chamber are of brick masonery and their outer sides are covered with a clay plaster prepared by mixing clay, rice husk, cowdung and water, Space within the four walls of the plinth is filled with sand, glass pieces and dry powdered common salt. The oven is heated by burning fire wood pieces arranged horizontally in two or three layers in the centre of the floor of the chamber. After the oven has acquired the requisite temperature, the ash is removed from the chamber and the coal which is still burning is moved along the sides of the chamber.

Making of Breads, Buns and Rusks

Breads and buns are made out of dough prepared by kneading a mixture of white flour, sugar, salt, yeast and water. Dough for buns contains ghee, milk and eggs in addition to the above mentioned materials. When the dough is ready and has attained temperature of 70° to 75° F, it is put into bread moulding boxes made of tin sheets and baked in the oven.

Bread and rusks are based at 300° to 350° F while buns are baked at 280° to 300° F. It takes 20 to 25 minutes to bake them properly.

Popular sizes and weights of breads, buns and rusks are as under :—

	Size	*Weight*
BREADS	9"×3"×3"	1 lb.
	4½"×3"×3"	½ lb.
	2½"×2½"×3"	¼ lb.
BUNS	6" diameter	4 oz.
	4" diameter	2 oz.
RUSKS	2" diameter	1 oz.

FUNCTIONS OF MATERIALS USED IN MAKING BAKERY ARTICLES

White Flour

White flour which contains 70% of starch, 10% of gluten, 8% of glucose and 12% of moisture should be used for making breads, biscuits, cakes etc. Quality of the white flour can be tested by its absorbing capacity. Flour which can absorb 60% of water by weight is considered good for bakery articles. Flour containing less than 10% of gluten will retard the process of fermentation in the bread dough. Flour containing more than 12% of moisture should not be purchased as it is liable to become lumpy if stored for a few months.

White flour which is not to be used immediately should be packed in gunny or cotton cloth bags and stored in a room in which there is provision for free circulation of air.

Sugar

Function of sugar in the bread dough is to impart the requisite brown colour to the top of the bread and to give it a sweet taste.

Salt

Salt is an essential ingredient of bread dough as it help in increasing the volume of the bread cakes etc. Bread cannot be prepared out of dough which does not contain salt.

Yeast

Function of the yeast is to provide requisite fermentation in the bread dough. For preparing bread dough out of 10 lbs. of floor ¼ oz. of hop yeast or 2 oz. of imported yeast is required.

Preparation of Hop Yeast

Hop yeast is prepared as explained below:—

"Boil one lb. of water containing 1/32 oz. of hop in a vessel till 25% of the water is evaporated. Let the hop water solution cool down to the room temperature and then strain it through a coarse cotton cloth. Mix ¼ oz. of sugar and ½ oz. of white flour to the above mixture and shake it well. Then add to it one oz. of boiled minced potato and let it solidify to make milky white coloured yeast. It takes 8 to 9 hours during summer and 20 to 22 hours during winter to make yeast out of thick solution of hop water, sugar, flour and boiled potato.

Recipes of Bread and Rusks

1. White flour	10 lbs.
2. Sugar	1 lb.
3. Salt	2 oz.
4. Hop yeast.	¼ oz.

Recipes of Buns

1. White flour	10 lbs.
2. Sugar	2 lbs.
3. Salt	2 ozs.
4. Hop yeast	¼ oz.
5. Vegetable ghee	4 ozs.
6. Milk	4 ozs.
7. Eggs	4 Nos.

Wrapping of Bread

Bread should be wrapped in paper after it has cooled down. If hot bread is wrapped, it is liable to catch disease called 'Rope' resulting in separation of starch and protein which will produce offensive smell in the bread.

Biscuits

Biscuits are mainly of two kinds (i) Saltish and (ii) Sweet.

Recipes of Biscuits

Saltish Biscuits

1. Flour	40 ozs.
2. Sugar	6 ozs.
3. Vegetable Ghee	14 ozs.
4. Amonia-bi-cab	¾ oz.
5. Water	6 ozs.
6. Salt	½ oz.

Sweet Biscuits

(A) Ordinary Quality :

1. Flour	20 lbs.
2. Sugar	1 lb.
3. Vegetable Ghee	10 ozs.
4. Soda-bi-Carb	¼ oz.

(B) Popular Quality :

1. Flour	32 ozs.
2. Sugar	16 ozs.
3. Vegetable ghee	16 ozs.
4. Eggs	2 Nos.
5. Baking powder	2 tea spoon full

Biscuits Dough

Biscuits dough is prepared by mixing together ghee, sugar and eggs to which is added white flour and baking powder or soda-bi-carb mixed separately. The above ingredients are then thoroughly kneaded till a homogeneous mass is obtained.

Shaping of Biscuits

Biscuits dough is flattened with a wooden roller or with a biscuits rolling machine to the required thickness and cut into pieces of required shape and size with help of biscuit cutters.

Baking of Biscuits

Green biscuits are arranged in a tin tray and baked in the oven having a temperature of 200°F approximately. It takes 15 to 20 minutes to bake the biscuits.

Cakes and Pastries

Cakes and pastries are mainly of two varieties. (1) Plain; and (2) decorated with icing sugar. Ingredience of cakes and pastries are the same and the only difference in them is in their shapes.

Recipes of Cakes & Pastries

1. **Ordinary type :**

Flour	8 ozs.
Sugar	8 ozs.
Vegetable Ghee	4 ozs.
Eggs	3 Nos.
Water	4 ozs.
Baking Powder	¼ oz.

2. **Better Quality :**

Flour	8 ozs.
Sugar	8 ozs.
Vegetable Ghee	8 ozs.
Eggs	8 Nos.
Baking Powder	¼ tea spoon full.
Dry fruit	

Preparation of Dough for Cakes and Pastries

Dough for cakes and pastries is prepared as explained below :—

Mix ghee with sugar and rub them with hand till cream like paste is formed. Then add eggs to the above paste gradually and continue rubbing the ingredients till sugar is completely dissolved. After that add small quantity of flavour, baking powder and dry nuts. It is then poured into the cake and pastry moulding boxes.

Baking of Cakes

Baking cakes and pastry is done in a baking oven having a temperature of about 250°F. It takes 15 to 20 minutes to bake the cakes and pastries at the above mentioned temperature.

Decoration of Cakes and Pastries

Cakes and pastries are decorated with plain or coloured "icing sugar" in different designs with the help of icing metal nozzles of different sizes.

"Icing Sugar" is prepared by mixing water, sugar and cream of tartar and boiling the mixture to a thick syrup.

After that pour the syrup in a basin and stir it well with a wooden or metal spatula till a thick paste is formed. It is now ready for decorating the cakes and pastries.

"Coloured icing sugar" can be coloured by adding edible colours to icing sugar.

Confectionery

Lozenges, sweet drops, lolly pops, Chaina balls etc. are made out of syrup in semi-plastic state.

Making of Syrup Paste

Syrup paste for lozenges, sweet drops, lolly pops etc. is prepared as under :—

"Boil sugar in water and stir it well with a wooden or metal spatula till the mixture becomes thick. Then add cream of tarter and continue stirring the syrup, till its temperature is 320°F. After that pour the syrup paste on a stone slab and mix edible colour by turning the syrup up and down with the help of a metal spatula. Then add small quantity of citric or tartaric acid and a few drops of essence. Colour of the essence should be the same as that of the edible colour. The paste is now ready for shaping into lozenges, sweet drops etc.

Recipes of Lozenges

1st Grade

Sugar	10 lbs.
Glucose	2½ lbs.
Water	10 lbs.
Cream of tartar	Nil.

2nd Grade

Sugar	10 lbs
Glucose	1½ lbs.
Water	10 lbs.
Cream of tartar	One tea spoon full.

3rd Grade

Sugar	10 lbs.
Glucose	Nil.
Water	10 lbs.
Cream of tartar	One tea spoon full.

Shaping of Lozenges. Sweet Drops etc.

Shaping of lozenges, sweet drops, lolly pops, chaina balls etc. is done with the help of brass moulds fixed in a hand operated press.

The machine for making sweet drops, consists of two brass rollers having designs to be imparted on the sweet drops. Both the rollers have pinions and are fixed in an iron frame. They are operated by a handle fixed to one of the rollers. Their movement is in opposite direction and therefore when the sugar paste is passed through them, the designs in the rollers are filled with sweet drops which automatically come out of the rollers as they are moved with the handle of the machine.

Shaping of lolly pops is done with the help of a metal mould having requisite designs and fixed to a hand operated lever press.

'Chaina Balls' are made with the help of a mould consisting of two flat iron pieces having cutters fixed on one of their sides. The cutters are made of thin iron strips and fixed in parallel at a distance equal to the diameter of chaina balls to be prepared. A separate mould is required for making each size of Chaina balls.

To make chaina balls, sugar paste is flatened to a specific thickness and then pressed between the two parts of the mould with their channels at right angles to each other, when square pieces are made. These are then rolled in between the channels of the two parts of the mould to make chaina balls.

Toffees

Toffees are prepared as explained below:—

"Boil milk in a vessel till 25% of its water is evaporated. Then add sugar and glucose to the boiling milk. When the above mixture becomes sticky add Vanila flavour or Coco and pour it on a glazed stone slab. After that flaten the toffee paste with the help of a wooden roller and cut it into pieces of required size. When the toffees are dry, wrap them in cellophone or butter paper".

Recipe of Toffee

Milk	2 lbs.
Sugar	½ lb.
Glucose	½ lb.

NOTE :—Powdered milk can be used if fresh milk is not available.

Chocolates

Chocolates are prepared as explained below:—

"Put coco powder" in milk and stir the mixture till coco is fully dissolved in milk. Then add sugar and glucose to the above mixture and boil it in a vessel which is kept in an other vessel containing water till a thick paste is formed. After that pour the paste on a glazed stone slab. When the chocolate paste becomes hard, cut it into pieces of required size.

Recipe of Chocolates

Milk	2 lbs.
Sugar	½ lb.
Glucose	½ lb.
Coco powder	¼ lb.

NOTE :—For making chocolates of cheaper variety, small quantity of wheat flour is also added to the above materials.

LIST OF TOOLS AND EQUIPMENT REQUIRED FOR MAKING (BREADS, BUNS, BISCUITS, RUSKS AND CAKES)

Description	Qty.	Approximate Cash Rs.
1. Baking oven having sixty, four square feet baking area (8′ × 8′)	1	750·00
2. Wooden working table 6′ long, 3′ broad and 3′ high with galvanised sheet on its top	1	100·00
3. Galvanised iron tub of oval shape 2′—3″ long, 1′—6″ wide and 9″ high	1	15·00
4. Sets of weighing scale & weights of 10 lbs. capacity	two sets	12·00
5. Aluminium pan of 10 lbs. capacity for hop making yeast ..	1	8·00
6. Glass jar for storing hop water	1	5·00
7. Sieves	2	2·00
8. Bread moulding boxes		
(a) 1 lb. size	12	10·00
(b) ½ lb. size	24	12·00
(c) ¼ lb. size	48	15·00
9. Wooden slab with round handle (total length 12 ft.) for arranging firewood in the oven and keeping of bread moulding boxes in the oven	2	40·00
10. Tin trays for keeping bread moulding boxes (size 18″ × 11″ × 1″)	24	25·00
11. Iron sheet trays for keeping biscuits to be baked (size 18″ × 18″ × ¾″)	12	40·00
12. Biscuit cutters of different shapes and sizes	12	15·00
13. Wooden rollers for flattening of dough of biscuits	4	8·00
14. Stone slab with smooth surface (18″ × 18″ × ½″)	1	30·00
15. Galvanised iron sheet drums with lids for storing of materials	6	100·00
16. Glass jars for storing biscuits and cakes	12	55·00
17. Iron enamelled basins	2	10·00
18. Cake moulds of different sizes and shapes	50	60·00
19. Metal utensils :		
(a) aluminium mugs	2	4·00
(b) aluminium frying pan	1	2·00
(c) iron enamelled bucket	1	15·00
(d) galvanised iron bucket	1	5·00
(e) galvanised iron drum with lid and tap	1	20·00
20. Thick cotton cloth for covering bread dough	6 yds.	8·00
21 Cotton coarse cloth for covering moulding boxes containing dough	20 yds.	25·00
22. Stainless steel slicer for lifting backed biscuits from the trays	2	6·00
23. Metal whisk for beating eggs	2	4·00
24. Table knives	2	4·00
25. Pair of scissors for cutting paper and making of fancy breads	2	6·00
26. Thermometer (cold and hot)..	2	20·00
27. Heat indicator manually operated	1	10·00
28. Flour kneading machine	1	1,500·00
29. Electrically operated flour kneading machine including electric motor	1	3,000·00
30. Biscuit rolling machine	1	1,200·00
31. Electrically operated biscuits rolling machine	1	2,700·00
32. Wooden stand with revolving top for decorating of cakes ..	1	20·00

LIST OF TOOLS AND EQUIPMENTS REQUIRED FOR MAKING LOZENGES, TOFFEES AND CHOCOLATES

		Rs.
1. Copper or brass vacuum pan for boiling mixture of sugar and water	1	125·00
2. Metal pan for demonstrating the process of making syrup ..	1	45·00
3. Sand stone (size 3 ft. long, 2 ft. broad and 2" thick) fixed on wooden stand three feet high	1	60·00
4. Table for making lozenges (5 ft. long, 3 ft. wide and 3 ft. high)..	1	50·02
5. Rubber sheet (5"×3"×$\frac{1}{8}$")	1	30·00
6. Wooden spatula for stirring syrup	1	1·00
7. Metal spatula (size of blade 12"×1$\frac{1}{2}$"×$\frac{1}{8}$")	1	5·00
8. Pair of tailor's scissor	1	10·00
9. Thermometer up to 400° F (cold and hot)	1	12·00
10. Lozenges shaping machine (hand operated) including rollers engraved with different shapes of lozenges	1	600·00
11. Hand operated 'Lolly pop' making machine including brass moulds	1	125·00
12. Hand operated 'Chaina ball" making machine	1	275·00
13. Seive (size 2 ft. long and one ft. wide fixed to a wooden frame). The sieve should have 8 to 12 mashes per inch. It is required for separating small pieces of broken lozenges	1	6·00
14. Glass jars for storing of lozenges	12	55·00
15. Galvanised iron drums with lids for storing sugar and water ..	2	20·00
16. Iron enamelled mug	1	2·00
17. Iron enamelled bucket	1	15·00
18. Aluminium vessel for measuring water ($\frac{1}{4}$th seer capacity) ..	1	1·00
19. Aluminium pans with handles for preparing chocolates and toffees	2	15·00
20. Iron enamelled sauce pan with handle	1	8·00
21. Aluminium kettle with handle for boiling water	1	7·00
22. Toffee cutter	1	85·00
23. Iron square rods (16"×$\frac{1}{2}$"×$\frac{1}{2}$")	1	4·00
24. Stone with glazed surface (18"×18"×$\frac{1}{2}$")	1	30·00

LIST OF UTENSILS AND EQUIPMENTS REQUIRED FOR MAKING SWEETS

		Rs.
1. Coal fired bearth	1	20·00
2. Large size pan of iron sheet	1	15·00
3. Kerosine oil pressure stove	1	30·00
4. Iron ladle for stirring of materials of sweets		
5. "Basket" (made of galvanised iron wire) for frying of sweets before decorating them	2 ..	4 .00 ..
6. Electric Stove	1	40·00
7. Sheet iron trays	2	10·00
8. Wire gauze tray covers	2	5·00

SYLLABUS FOR TRAINING IN MANUFACTURE, DYEING, CUTTING & MAKING UP OF HOSIERY GOODS

Length of Training—12 months.

Notes :—1. Lectures on manufacture of Hosiery goods should be given four times a week, and lectures on dyeing, and cutting & making up of garments should be given once a week on each topic.

2. The duration of the lecture period should not exceed one hour.

3. The practical work should be so arranged that Cutting, Making up of garments and dyeing practical should be done once a week each and rest of the days should be kept for practical in the Manufacture of Hosiery goods.

4. Trainees should make their practical note books as well as theoretical note books and they should paste the samples produced on knitting machines or in Dyeing in their practical note books along with the procedure and sketches where necessary.

5. Tests should be held each month and the record should be kept of the progress made by each trainee.

6. The theoretical note books and practical note books should be checked and corrected wherever necessary by the teacher concerned at least once a week.

7. The lectures on theory should be given in class rooms but the practical work taught for demonstration should be given in the practical rooms.

DETAILED SYLLABUS ON MANUFACTURE OF HOSIERY GOODS

Month (1)	Practical (2)	Demonstration (3)	Theory Lecture (4)
1.	Practice on yarn winding on hand winding machine such as Charkhas and hand winders. Practice on Knot tying.	Demonstration in yarn winding, knot tying.	Lecture in preparation or dampening or lubricating the knitting yarns prior to knitting.
	Setting up and producing welt on hand socks machine.	Setting up and producing welt on hand socks machine.	Functions and diagrams of various cams of hand socks machine.
	Knitting heel and toe of socks.	Demonstration in knitting heel and toe of socks.	Lecture on how to tie various kinds of knots.
	Fixing the ribbing attachment to the socks machine.	Demonstration in adjustment of the stitch cam of the hand socks machine for different stitch length.	Sketches of Reef knot and weavers knot.
	To set up for one by one rib		Lectures on types of yarn used in hosiery industry such as cotton, wool, silk, rayons and nylon.
2.	Practice on knitting plain socks	Details of various sizes of socks and stockings.	Principles of loop formation of latch needle with their sketches.
	Practice on knitting double top stockings, plain and Mock rib (without ribber).	Demonstration of loop formation with latch needle. Names of the various parts of latch needle.	Characteristic features, physical properties and identification of cotton, wool and silk by means of burning tests.
			Yarns packages available in the markets along with the counts which are mostly used for hosiery industry.
3.	Knitting of ribbed socks, Three quarter and broad rib.	Demonstration how to run the fabric on to the cylinder needle loop by loop.	Selection of the relevant counts of cotton and worsted yarns for different gauge of hand socks, plain.
	Running the fabric on to the cylinder needle and clearing the same.	Demonstration in oiling, cleaning and fitting of various parts of hand socks machine.	Circular and circular machines with ribber.

DETAILED SYLLABUS ON MANUFACTURE OF HOSIERY GOODS—*contd.*

(1)	(2)	(3)	(4)
4.	Practice on linking the toes and turned tops of stockings by hand.	Demonstration in linking toes and turned tops of stockings.	Lecture on fancy stitch such as Tuck, Jackauared, Platted stitch etc. Method of finding the gauge of Hosiery machine *viz.* hand socks, Plain Circular and circular machine with ribber.
	Practice on adjustment of stitch cams of hand socks machine for various stitch lengths.	Demonstration of setting up the plain circular machine for producing mufflers.	
	Practice in knitting Tuck design socks	Setting up of ribber round machines for producing jerseys etc.	
5.	To knit Jackaured designed socks (without floating).	Correct sizes of stockings and mufflers.	Cams system and functions of various parts of Plain Circular and circular machine with ribber. Various defects which occur during knitting and their remedies.
	To knit single top and turned down top stockings.	Demonstration in adjustment of splicing attachments, feeding of splicing yarn.	
	To knit mufflers with horizontal stripes ..		
6.	To knit platted socks with splicing attachment.	Demonstration in adjustment of splicing attachments, feeding of splicing yarn.	Lecture on designing the graphs and method of fitting designing bits in the patter wheel.
	Practice on knitting rib socks, Tuck design socks and Jackaured designed socks.	Demonstration in the adjustment of plain yarn feeders and platted yarn feeder.	
	To knit ribber jerseys on ribber machine	Various sizes of jerseys.	
7.	Knitting of fancy top stockings	How to fix the patter wheel	General mechanism and needle path of the socks and circular machines.
	Knitting of socks on patter wheel socks machine. To knit underwear garments on ribber machines.	Demonstration of fitting designing bits in the patter wheel.	

(1)	(2)	(3)	(4)
8.	Practice of mending cuts and press offs. Picking of the drop stitch in the machine. Mending the drop stitch outside the machine. Practice in knitting various kinds of slacks.	Demonstration in mending the cuts press offs and dropped stitches. Opening the various parts of the machine and re-fixing them at their proper places.	Definition of Technical terms, such as seaming, over seaming, flat seaming, pointseaming, linking welting, running on and binding off.
9.	Practice on knitting different types of jerseys, mufflers, tuck designed socks and single top stockings.	Demonstration on how to press socks, stockings and jerseys.	Lecture on advantages and dis-advantages of lubricating the knitting yarns.
		Tying of fringes to the mufflers.	
10.	Practice in knitting fancy top stockings. To knit full fashioned stockings.	Demonstration in knitting full fashioned stockings.	Definition of welt, kinds of welts such as Roll wolter English welt, French welt or Tubular welt and Racked welt.
	Practice in knitting different types of jerseys.	Demonstration on knitting Banyan fabric on simple round machines.	Method of producing these welts and properties of these welts.
	Practice in tying the fringes of the mufflers.		
11.	Practice on producing various kinds of socks, stockings, jerseys and mufflers.	Demonstration of adjustment of stitch cams tension wires for various fancy stitches.	General lecture on manufacture of hosiery goods and marketing the products.
12.	Thorough practice in producing all kinds of socks, stockings, jerseys and mufflers.	General demonstration of opening and fitting all the parts of hand socks, plain circular and circular ribber machine.	General information of the various counts of yarns, their prices and source of availability.
			Selling markets of Hosiery goods in India.
			Production centres of various kinds of Hosiery articles in India.

SYLLABUS FOR CUTTING AND MAKING UP OF GARMENTS

Month	Practical	Demonstration	Theory Lecture
(1)	(2)	(3)	(4)
1.	Threading of three thread over lock machine, and Lock stitch machine.	Precaution in bobbin filling and in needle fixing.	Technical terms in seaming and the definitions.
	Practice of seaming on small pieces	Seaming actions of the loopers and needles.	Mechanism of Lock Stitch and three thread over Lock machine.
	Bobbin filling and Insertion needle fixing	Structure of the over seam chain and Lock stitch chain.	(Once a week, one hour duration).
2.	Cutting of V. Neck without sleeves vests and cutting of round neck without sleeves vests. Seaming of both types of vests.	Measurements of Un-finished and finished vests.	Lecture on cutting and measurements of round neck and half sleeves vest and underwears.
		Precautions in cutting, such as avoiding wastes and utilizing the fabric in proper manner.	
3.	Cutting and seaming of half sleeves vests and Drawers.	Demonstration on how to avoid the waste in cutting the damaged fabric.	Lecture on measurements in cutting sports shirts with coat collar and tie collar and lady bodice.
	Practice on cutting and making up of V. Neck & Round neck without sleeves vests.		
4.	Cutting and making up of sports shirts and lady bodies.	Demonstration of latest designs.	Elementary knowledge of cutting outer wear garments.
	Practice on seaming of half sleeves vest and Drawers.		Graded sizes of outer wear garments. Cutting and maching up round neck and neck slipovers.
5.	Cutting and seaming of V. Neck and round neck slipovers.	Demonstration on three thread over lock machines and its use in slipover.	Lecture on cutting of pullovers with zip collar, high neck, and one piece pullover.
6.	Practice on cutting and seaming of pullovers of all kinds.	Demonstration in cutting of different shapes of pullover.	Lecture on reglan sleeves, one piece lady coat and double breast lady coat.
7.	Practice of cutting and seaming of lady coaties and coats.	Demonstration in cutting of various sizes of different types of outer-wear garments.	Lecture on cutting puff sleeves jumpers and babies garments.

(1)	(2)	(3)	(4)
8.	Cutting and seaming of baby garments	Demonstration of fancy seam stitches used in babies and ladies garments.	Lecture on cutting of baby suits with knicker and trousers.
9.	Cutting and seaming of baby suits	Demonstration in cutting of various sizes of baby garments.	Lecture on cutting bathing costumes bathing trunks.
10.	Cutting and seaming of bathing trunks and costumes	Demonstration in cutting costumes with flaps.	Lecture on cutting of gents combination.
11.	Cutting and making up of various types of collar.	Demonstration of pressing the finished garments.	Lecture on cutting of differents types. of collars.
12.	Cutting and making up of baby round neck and high neck garments.	Demonstration in cutting of baby garments.	Lecture on cutting of different types of lady bodices.

TABLE

Graded sizes of Slipover — Hosiery garments

Chest	18	20	22	24	26	28	30	32	34	36	38	40
Length	12½	14	15½	17	18½	20	21	22	23	24	25	26
Length of neck ..	7	7	7	8	8	8	9½	9½	9½	10	10	10
Length of armhole ..	6	6	6	8	8	8	9½	9½	9½	10	10	10
Height of border ..	2½	2½	2½	3	3	3	3½	3½	3½	3½	3½	3½

Graded Sizes of Pullover

Chest	18	20	22	24	26	28	30	32	34	36	38	40
Length	13	14½	15½	18	19	20	22	23	24	25	26	27
Length of neck ..	7	7	7	8	8	8	9½	9½	9½	10	10	10
Length of sleeves ..	9	10	11	14	16	18	21	21½	22	22½	23	23
Breadth of sleeves ..	8	9	10	10	11	12	13	14	15	16	17	18
Height & breadth of Pocket	2½	2½	2½	3½	3½	3½	4	4	4	4½	4½	4½
Height of border ..	2½	2½	2½	3	3	3	3½	3½	3½	3½	3½	3½

SYLLABUS FOR DYEING OF HOSIERY GOODS, YARNS ETC.

Months	Details of practical work	Demonstration	Lecture
1.	Dyeing of direct colour on cotton	Preparation of yarn for dyeing and its actual dyeing	Lecture for the dyeing of direct colours on cotton-sources of hardness of water methods of softening it.
2.	Dyeing of direct colour on art slik and silk ..	Do.	Lecture for the dyeing of direct colour on art silk and silk.
3.	Dyeing of basic colour on cotton	Do.	Lecture for the dyeing of basic colour on cotton. Lecture for the removal of stains from the animal and vegetable fibres.
4.	Dyeing of basic colour on art silk and silk ..	Do.	Lecture for the dyeing of basic colour on silk and art silk.
5.	Dyeing of sulphur colour on cotton and art silk.	Do.	Lecture for the dyeing of sulphur colour on cotton and art silk.
6.	Dyeing of vat colour on cotton and art silk ..	Do.	Lecture upon the classification of dye stuffs. Lecture for the dyeing of vat colour on cotton and art silk.
7.	Dyeing of Napthol colour on cotton and art silk.	Do.	Lecture for the dyeing of Napthol colour on cotton and art silk.
8.	Dyeing of acid colour on wool and silk ..	Do.	Lecture for the dyeing of acid colour on wool and silk.
9.	Dyeing of acid chrome colour on wool ..	Do.	Lecture for the dyeing of acid chrome on wool.
10.	Bleaching of cotton and art silk and other vegetable fibres.	Preparation of yarn for bleaching and actual its bleaching.	Lecture for the bleaching of cotton and art silk.
11.	Bleaching of wool and silk	Do.	Lecture for the bleaching of wool and silk.
12.	Dyeing of Union goods *i.e.* cotton and wool or cotton and art silk and dyeing of acetate silk.	Preparation of yarn for dyeing of union goods and its dyeing and acetate silk dyeing.	Lecture for the dyeing of union goods and acetate silken goods.

SYLLABUS FOR UPGRADING THE SKILL OF THE CRAFTSMAN IN THE MANUFACTURE OF HOSIERY GOODS

Length of training : *Twelve Weeks.*

Notes :—1. The lectures on theory should be given in class room and the duration of the lecture should not exceed one hour.

2. Theory periods should be taken thrice a week and the rest of the time should be devoted in practical works according to the syllabus.

3. The monthly practical and theoretical work should be divided in four equal parts. Theoretical and practical training should be imparted week-wise for each portion of the division made in the syllabus presenting for the month.

4. The daily demonstration talks should be given in the practical rooms and that should be relevant to that days' practical work. Of course instruction on precautions to be observed can be given in general classroom.

5. The yarn out of which the garments are to be produced should be got dyed by the students and the work done should be finished and made up by the students. This should be done during the course of their practical works.

ADDITIONAL THEORY AND PRACTICAL SYLLABUS FOR UPGRADING THE CRAFTSMEN IN HOSIERY MANUFACTURE

Month No.	Practical	Demonstration	Theory Lecture
1.	To remove the cuts in the cams. Correction of the angles of the cams, shaping the index of the stitch cams, for different counts of yarns to be used on the same knitting machine. To knit float stitch, tuck stitch, lace stitch and palerin stitch, socks, stockings, and jerseys.	Demonstration regarding the removal of cuts and correcting the angles of the cams. Production in removing the cuts etc.	Lectures and formulae to find the relevant counts of yarns to be used in knitting fancy stitches on plain circular and circular ribber machines.
2.	To knit diamond pattern, Honey comb stitch, diagonal cross bar pattern, lace stitch pattern on socks, stockings, slipovers etc.	Demonstration how to produce fancy stitches and correct standard sizes of socks, stockings, slipovers etc.	Classification of textile fibres according to their origin, microscopic appearance of the cotton, wool and silk fibres. Detection of cotton fibres in the presence of wool. Primary stitches in weft knitting and structural appearance (sketches).
3.	To knit Knee caps, elbow caps anklets on socks machines, by laying in the elastic threads.	Demonstration regarding adjustment of the laying in attachment to the socks machine.	Fabric analysis for reproducing a given garment. Lectures on the fancy stitches in weft knitting such as drop stitch, float stitch, tuck stitch, held stitches lay, stitch, palerin stitch, fleecy stitch or laid in stitch, racked stitch plain and rib stitch combination, plain and purl stitch combination, fancy plated stitches.
4.	To produce muffler of fancy stitches.	Principle of laying in.	

LIST OF MACHINES AND EQUIPMENTS WITH THEIR PRICES AND SOURCE OF AVAILABILITY

	Price	Source of Availability
1. Hand Socks Machines	Rs.	
1. 2·58×72×36	150/approx	Ludhiana market.
2. 3″×96×48	155/approx	
3. 3½″×132×66	175/ each	
4. 3½″×108×54 with elastic laying in attachment		
5. 3⅜″×120×60		
6. 3¾″×144×72		
7. 3½″×108×54 with pattern wheel ..		
8. 3½″×120×60 with double sole attachment		
2. Hand Driven Plain circular round Machines for Sweater		
1. 3¾″×108×54	150/ appro.	Ludhiana market.
2. 4½″×144×72	150/appro.	
3. 6½″×220×110	300/appro.	
4. 5½″×180×90	250/appro.	
5. 7½″×240×120	350/appro.	
3. Hand Driven Plain circular round machines for Mufflers		
1. 6½″×220	330/appro.	Ludhiana market.
2. 7½″×340	300/appro.	
3. 7″×300 with double cam system for upgrading the craftsman	300/appro.	
4. Machinery for Tailoring		
1. Three thread overlock with heming part, treadle operated.	600/appro.	Swrup Mechanical works, Ludhiana.
2. Single thread chain stitch machine treadle operated	The prices can be enquired from M/s. Singer Sewing Mannfacturing Co. Delhi.	
3. Five thread of six thread flat lock machines treadle operated.		
4. Lock stitch machines (ordinary sewing machines) treadle operated	200	Usha Sewing machines Company, Ludhiana.

EQUIPMENT

Item	Source
1. **Wooden Pressing Boards, Socks and Stockings.** Sizes 4", 4½", 5", 5½" 6", 6½", 7", 7½", 8", 8½"", 9", 9½," 10", 10½", 11", 11½", 12", 12½"	Ludhiana market. The prices range from Rs. 2 to Rs. 5 each according to the size and the material used.
2. **Wooden Pressing Boards for Mufflers** 10"×4½'×11"×4½'	
3. **Wooden Pressing Boards for Outerwear Garments** 18", 20", 22", 24", 26", 28", 30", 32", 34", 36".	
4. **Wooden Pressing Boards for Sleeves of Outerwear Garments** 18", 20", 22", 24", 26", 28", 30", 32", 34", 36", 38", 40".	
5. Wooden, Cutting table 9"×3'×4½'	Local market.
6. Pressing Table 9"×3'×4½'	
7. Scissors for cutting 1"	
8. Scissors for workers working on machines 9"	
9. Measuring tape	
10. Plain for pressing the fabric and finished garments.	
11. Brass iron weight 20 lbs. for ironing the fabric.	
12. Brass iron weight 16 lbs. for pressing the finished garments.	
13. Cotton seaming yarn cones 40/s or 60/s.	
14. Charcoal	
15. Wooden stools for workers	
16. Copper vat 3'×3'×2' provided these are to be fixed on fixed furnace and if these are required to be moved from place to place then capacity may be reduced as required.	
17. Galvanised iron trough one	
18. Wooden bent rod	
19 Bamboos. 10 only	
20. Enamelled glasses	
21. Measuring glass jar 4 only.	
22. Glass rod	
23. Weighing balance and weights ordinary	
24. Glass bottles of 2 lbs. capacity each	
25. Enamelled bucket one only	
27. Galvanized iron bucket one only	
28 Enamelled basin (big dish) one only	
29. Furnace ordinary	

NOTES—from item No. 3 to item No. 29, the prices can be enquired from the local market.
The dyestuffs can be purchased according to the requirements from M/s. Imperial Chemical Industries, Ltd., Ciba Dyes Ltd., or any other company which deal in the dyestuffs.

DETAILED SYLLABUS FOR HAND KNITTING BOTH PRACTICAL AS WELL AS THEORETICAL

Duration of the course—12 Months

Week	Practical	Practical Demonstration	Theory Lectures
(1)	(2)	(3)	(4)
1st and 2nd week	Practice on casting on with different methods *i.e.* thumb method, casting on with two needles, casting on by the corded method.	Practical demonstrations on these methods.	Principles of knitting (one hour period in a week.)
3rd and 4th week	Practice on casting on four needles, to knit plain stitch and to prepare a slipover size 18 inches.	Practical demonstration on how to perform casting on four needles and to knit plain stitches.	Theory lectures on casting on four needles and the appearance of plain stitch, when looked from the face and back.
5th and 6th week	Practice on knitting purl stitch and to knit a piece containing purl stitches.	Demonstrations on how to knit purl stitches.	Theory lectures on the distinction of the pearl stitch from plain stitch.
7th and 8th week	Practice on knitting plain and purl stitches together.	Demonstration on how to combine plain and purl stitches.	Lectures on the abbreviations used in hand knitting.
9th and 10th week	Practice on ribbing and grafting.	Demonstration on how to produce welts for neckbands and cuffs.	Theory lectures on the use of ribbing and grafting.
11th and 12th week	Practice on increasing and decreasing the stitches in order to shape the garments.	Demonstrations on how to perform increasing and decreasing for arm holes, necks etc.	Lectures on maintaining the correct tension in knitting and the correct selection of needles for the selected materials.
13th and 14th week	Practical work to knit slipover size 24″	Demonstrations on how to produce diamond designs in combining plain and rib-stitches.	Theory lectures on how to produce correct measured garments—various sizes and dimensions.
15th and 16th week	Practice on knitting designs in various colours.	Demonstrations on how to join wools, and how jacquard patterns are produced.	Theory lectures on selection of colours for knitting jacquard designs.

DETAILED SYLLABUS FOR HAND KNITTING BOTH PRACTICAL AS WELL AS THEORETICAL—*contd.*

(1)	(2)	(3)	(4)
17th and 18th week	Practice on knitting a pullover containing plain, rib and puri stitches.	Demonstrations on how to combine these stitches in order to produce various designs.	Theory lectures on finishing the prepared articles.
19th and 20th week	Practice on knitting half sleeved jumper jacket with horizontal designs.	Demonstration on how to produce horizontal designs.	Theory lectures on how to prepare graphs for various designs and preparation of knitting tables.
21st and 22nd week	Practice on knitting socks (plain and designed).	Demonstration on how to knit socks and grafting.	Theory lectures on the measurements, tensions and selection of materials for knitting a pair of socks.
23rd and 24th week	Practice on knitting gloves, right hand and left hand.	Demonstrations on how to knit gloves and joining of or grafting the figures.	Theory lectures on measurements, tensions and selection of materials for knitting a pair of gloves.
25th and 26th week	Practice on knitting open work garments *i.e.*, bed jacket with full sleeves.	Demonstrations on how to produce lace work.	Theory lectures on designs and colours.
27th and 28th week	Practice on knitting vests or shamizes having lace stitches.	Demonstration on how to shape the arm holes, and the neck in the production of shamizes and vests.	Theory lectures on the selection of materials, measurements and tension for preparing vest and jumpers.
29th and 30th week	Practice on knitting an underewear by increasing and decreasing the stitches.	Shape of the underwear and its dimensions.	Theory lectures on shapings *i.e.*, traingular rounded shapings, button holes etc.
31st and 32nd week	To prepare a garment of basket design containing plain and purl stitches.	Demonstrations on how to produce basket designs and traingular pattern.	Theory lectures on how to prepare design charts and reading of the signs of the charts.
33rd and 34th week	Practice on knitting cable pattern on a garment.	Demonstrations on how to produce cable designs.	Theory lectures on how to prepare design charts for cable patterns, fancy rib and zig zag pattern.
35th and 36th week	Practice on producing plain knitted borders and ribbed borders for the preparation of shawls.	Demonstration on how to knit plain and ribbed borders.	Lectures on finshing method pressing and making up of garments.

DETAILED SYLLABUS FOR HAND KNITTING BOTH PRACTICAL AS WELL AS THEORETICAL—*contd.*

(1)	(2)	(3)	(4)
37th and 38th week	Practice on producing raised design	Demonstrations on how to produce raised effects in a knitting garment.	Lectures on borders and edgings *i.e.*, separate border, solid pattern border, shaped edge border, lace insertion border, etc.
39th and 40th week	Practice on knitting dolls' dress, coat and cap.	Demonstrations on how to produce dolls' dress, coat and cap, with the combination of plain, rib, purl and open stitches.	Measurements of the misc. articles *i.e.*, vests, petticoat, cap, knickers, dress and jacket.
41st to 52nd week	Thorough practice on knitting of different designs and sizes of vests, petticoats, caps, knickers, dresses and jackets etc.	Demonstrations on knitting these articles	Theory lectures on finishing and pressing these articles.

NOTES—: Working hours on each working day should not exceed more than five hours. One hour should be kept for practical demonstrations and four hours for the practical work. Theory periods should be taken once a week and the duration of the period should not exceed more than an hour.

LESSON NOTES ON
HAND KNITTING

The principle of hand knitting is to form loops of the knitting thread by means of needles. In order to cast on, make a slip loop and make it cast on and makė as many stitches as required. Hold needle containing the slip loop in right hand, with left hand hold wool under fingers, pass wool under and over the thumb to form a loop: pass needle from left to right through loop, retaining the later on needle and drawing wool close. Repeat until there are required stitches.

DIFFERENCE OF STRUCTURE OF THE PLAIN, RIB AND PURL FABRICS.

Plain Fabric:—When the plain fabric is examined from its back, needle and sinker loops will be seen and its face will show longitudinal portions of the loops only.

Rib Fabric :—This will show longitudinal portion of the loops on both the sides. It corresponds to the face of the plain fabric on both sides.

Purl Fabric:—In its ordinary state, it looks like the back of the plain fabric on both sides but when stretched longitudinally, it will show sinker loops and needle loops in one course and in the next course it will show longitudinal portions of the loops and at the back of it, it will be *vice versa.*

ABBREVIATIONS USED IN HAND KNITTING

K : Knit plain P : Purl

....: Repeat the entire portion between the two stars as often as instructed.

K. 2 tog. F. : or K. 2 tog : Knit 2 stitches together through the front of the loops.

K. 2 tog. B. : Knit 2 stitches together through the back of the loops.

S.K. 2 tog. D. : Slip 1, knit 2 together frontways, draw the slipped stitch over the 2 knitted together.

wf : Wool forward to make a stitch, and take the thread back over the needle to knit the next stitch or stitches.

Wr : Wool round the needle, to make a stitch, before a purled stitch.

St : Stitch.

Ribbing.—Ribbing is used mainly for welts, neck bands, and cuffs, when the fabric needs to be elastic but well fitting. It is a combination of vertical columns in plain and purl stitches.

Grafting.—This is the method of joining two sets of stitches in flat join.

Tension and Needles.—The tension of the knitting is affected by the size of the needles used. The tension of the knitting will also affect the size of the finished garment and it is always advisable to knit a small section and check the tension.

To produce a correct measured garment, it is advisable to knit a small piece, with the wool and needles specified and count the stitches per inch. This will help in producing the correct measurement.

SELECTION OF COLOURS FOR KNITTING JACQUARD DESIGNS.

The colours for the jacquard designs should be so selected that they should produce harmoneous effect. Usually there are three primary colours yellow, red and blue which when combined together make a complete circuit and hence either of these colours should be combined together or along with their components. The students should be trained and be demonstrated by placing different shades of threads together and selecting the correct combinations.

Casting off.—Casting off secures the last row of stitches, thus preventing them from running. It is usually completed in the same tension as the rest of the garments, but when done on needles two sizes large than the pattern required more elastic edges are obtained.

In simple casting off, knit the first two stitches and with left hand needle, slip the first stitch over the second. Repeat until the last stitch, when the wool is broken off and pulled through the last loop and run in securely.

SYLLABUS FOR TRAINING IN MAT-WEAVING IN C.D. BLOCKS

A—For Persons who are new to the Trade

Duration of Training Course—months

Subject	Short Lesson Notes on Theory	Practical Exercises
1st Week		
Cutting and Bundling of grass.	Various types of grass available in the region for mat-weaving. Grass or weed as is called (Botanical name—cyprus tegateem) is the major raw material for making mats. Some kinds of grass is cultivated and some are of natural growth and are generally found near the rivers, canals, streams and in marshy lands. It takes about six months for the grass to grow to a height of about five feet and mature. Its harvest periods are (i) April to May and (ii) November to December.	Practice in cutting of grass with a SICKLE and bundling at the fields. Grass which is fully matured but not dried should only be cut.
2nd week		
Sorting and sizing of grass.	Before sorting the grass, its leaves should be cut with a knife. Grading is done according to the sizes of grass in the bundles.	Practice in sorting and sizing of grass.
3rd week		
Splitting and drying of grass.	After sorting and grading, the grass should be kept in sun light for two or three hours so that it becomes smooth for splitting. Splitting should be completed within two or three days. If splitting is delayed, the grass is liable to loose its original colour. For making coarse mats, grass split into two equal parts is used and pith from the grass strips is generally not removed. For making finer variety of mats, grass strips prepared by splitting grass into 4, 8, 12, 16, 24 & 32 equal parts are used and they must be free from pith. Grass strips required for making coarse mats are dried in sun light for two or three days after splitting while those for finer variety of mats are dried for two or three hours preferably under shade. The split grass should not be exposed to rain.	Practice in splitting of grass in 2, 4, 8, 12, 16, 24 & 38 equal parts with a sharp single edged pointed knife 4" long. Each trainee to split about three lbs. of grass, dry it and bundle it for storing.

Subject	Short Lesson Notes on Theory	Practical Exercises
4th & 5th week Dyeing of grass strips	The grass to be dyed must be of uniform thickness. Generally synthetic dyes are used for dyeing of grass. In some states, bark, roots and branches of local trees suitable for dyeing are used. As for example bark of 'Patanga' tree available in Kerala State is used for dyeing grass in brown and black colours. *Dyeing of grass with 'Patanga' tree bark.* Boil the bark in a vessel containing water for about ten hours and then boil the grass to be dyed in the bark solution for about 4 hours. After that take out the brown coloured grass from the vessel and dry it in shade. For making black coloured grass, the brown coloured grass prepared by the above mentioned process is kept in a thick clay paste for about ten hours and afterwards cleaned and dryed in shade. *Dyeing of grass with synthetic dyes.* Boil water in a vessel and then add to it requisite quantity of dye stuff. Stir the dye solution well and then put the grass into it. After about fifteen minutes the grass is taken out and dried in shade. The trainees should be made conversant with the trade names of synthetic dyes and local names of trees and plants used for dyeing of grass.	Practice in dyeing of grass with bark and roots and branches of tress used for dyeing of grass (if available in the region) and synthetic dyes in different colours. Each trainee should dye about five pounds of grass.
6th to 11th week Warp thread making	Grass mat warp is prepared from cotton, silk, aloe and jute yarn. Cotton warp is prepared from cotton yarn of 6, 8 and 10 counts. The yarn should be soaked in water for about ten hours and then wound on bobbins. After that the yarn is doubled with the help of a Takli of Charkha. Silk warp thread is prepared by twisting together 4 or 6 silk threads. Jute warp thread is also made with the help of a Takli. Jute twine is available in the market also.	

Subject	Short Lesson Notes on Theory	Practical Exercises
6th to 11th week—(contd.)		
Warp thread making	*Making of Aloe Fibre* Remove the tender leaves from the aloe plant, place the plant, on a soft wooden slab (4′×8′×4″) and then remove the greenish pulpy matter from it by scraping the aloe plant with a sharp edged bamboostrip (18″×2″). After extracting the pulpy matter, the fibres should be dried for an hour and then separated with hand. When the fibre is ready it is spun into yarn. Extraction of aloe fibre is also done by hand or power operated "RESPADOR" machine and cleaned with a hand or power operated fibre cleaning machine.	Practice in twisting and doubling of cotton, silk, fibre and jute yarn, extraction of aloe fibre from aloe plant and making of yarn out of it. Practice in making of aloe fibre with the help of 'respador' machine. Practice in winding of cotton, silk and fibre yarn on bobbins.
12th to 23rd week		
Weaving of mats ..	(*a*) space required for installing the loom. (*b*) Various parts of looms. (*c*) setting up of the loom on the floor. (*d*) Looming—entering the warp threads in the reed—various types of reeds. (*e*) fitting (adjusting) of warp. (*f*) formation of the shed—various kinds of sheds. (*g*) weaving—use of a shuttle. (*h*) beating of weft (grass strips). (*i*) various types of weaves—single weave (1 up and 1 down), double weave (2 up and 2 down) and curtain weave—explaining thereof on graph lines. (*j*) various sizes of mats in vogue. (*k*) costing of mats—trainees should be made conversant with the prices of materials required for making mats. (*l*) type of instruments required for making designs, talk on elementary dyeing, making of border and body designs and their reproduction from graph paper to the mats.	Practice in setting up of loom entering of warp into reeds and formation of sheds Making of designs in different colour schemes on graph paper. Each trainee will weave two plain mats, two double weave mats and two mats with geometrical designs. *Setting up of Loom* The space required to put up a mat loom is 10′×10′. In this space 4 wooden pegs will have to be fixed firmly to the ground having 5′ width *i.e.* 4½×10′ (at the 4 corners). The second warp bamboo will have to be tied to the two pegs with the help of a coir or cotton rope leaving a loose space of 1½′. This is for tightening the loom. Then the reed must be kept 2′ away from the second warp bamboo. The width of the mat will be according to the length of the grass available. Two threads in last dent should be on either side of the warp. After putting the warp in this way, thread must be firmly fixed to the

Subject	Short Lesson notes on Theory	Practical Exercises
12th to 23rd week—(contd.) Weaving of mats—*(contd.)*		first warp bamboo. The second warp bamboo must be fixed firmly by the coir or cotton rope. Half the threads in the warp is below and the other half is above the second warp bamboo. Each end below the bamboo should be tied with the help of thread just like healds in cotton weaving which forms the shed. The healds are then tied to a tri-stand for carrying out the operation. The first shed will be formed by taking the thread bamboo which is in the centre, very near to the reed. The second shed will be formed by pressing the warp by the help of a wooden reaper. The grass will be drawn through the help of a wooden shuttle in each shed. *Different kinds of sheds* *Single shed.*—In this half the warp threads will be upwards whereas the other half will be below. One thread covers each hole of the reed. *Double shed.*—The total number of threads in the warp will be counted. The first thread is left below and the other thread is lifted up on both the edges of the warp. From the remaining threads it is so arranged that two threads come up and two threads go below. In this shed also one thread comes in one hole and two threads will remain for each shed. The inter-lacement of warp with the weft is called weave. In mat weaving reeds rare used for we . One 'person can prepare one mat working for 8 hours in a day on two or three dents reed per inch. Coloured reeds may be placed at the commencement of the mat. Considerable delay will occur in preparing the mats out of 4 split grass. 4 to 5 lbs. of reed is necessary to finish a single shed mat and 5-6 lbs. for double shed mat.

Subject	Short Lesson Notes on Theory	Practical Exercises
12th to 23rd week—(*contd.*) Weaving of mats—(*contd.*)		The design is first drawn on a graph paper. The required threads in the warp are to be calculated according to the design. As per the design written on the graph sheet, the number of threads required for the design has to be counted and the threads that are available in the loom should also be counted and properly distributed. Afterwards as per design written on the graph paper threads will have to be taken up and down on the shuttle and leaving it behind the reed and afterwards one colour grass and one plain grass will have to be used alternatively for every stage of design. The stage of sheds be formed separately for each and every step. Varieties of Designs: 1. Bugidi. 2. Square. 3. Zig zag. 4. Rudrakshi. 5. Square flower. 6. Complicated designs. 7. All kinds of geometrical designs.
24th week Finishing of mats ..	Lecture on advantages and dis-advantages of solvedging the mats, their trimming and finishing.	Practice in trimming, solvedging and finishing of mats.
25th to 26th week	The trainees will be examined in the various processes of weaving mats.	The Trainees to be examined in the various processes of mat weaving.

B. Training of Artisans in Mat Weaving for upgrading their skill.

Duration of Course—Three Months

Practical exercises

1. Practice in making of warp threads from cotton, silk and fibre yarn and warp-threads with the help of takli, charkha and spinning and doubling machines.
2. Practice in dyeing of grass in different colours with basic, synthetic dyo-stuffs and vegetable dyes.
3. Making of about 20 designs for mats on graph papers.
4. Processing of grass required for making mats of super-fine quality.
5. Practice in weaving of mats on pit looms and frame looms.
6. Each trainee to weave one mat each of medium, fine and super-fine quality.
7. Practice in making of lamp shades, ladies handbags, purses, belts, ladies chappals out of grass mats.
8. Practice in weaving of screw-pine mats.

Theory

1. Lecture on various types of grass, places where they are available, the type of soil required for growing grass, instruments used for cutting the grass and techniques involved in bundling, sorting, splitting and drying of grass.
2. Lecture on selection of various types of yarn used in grass, mat weaving tools and techniques employed in twisting and doubling of yarn required for making warp of the mats.
3. Lectures on tools and techniques employed in dyeing of grass with synthetic dye-stuffs and vegetable dyes and their trade names.
4. Lecture on various types of looms used for weaving of grass mats and their specifications.
5. Lecture on types of designs used in grass mats and their reproduction from graph paper to the mats.
6. Lecture on different types of weaving of mats and their costing.
7. A general talk on the use of grass mats for preparing artistic articles.
8. Lecture on marketing of mats in the Country and abroad.

BRIEF NOTES ON SCREW PINE MAT WEAVING

Screw Pine Mats

Raw Material

This is a plant generally grown in sandy and marshy places on the west coast of India by the side of small streams, ponds, fences of fields and other compounds. Its botanical names is PANDA-NUS-TECTORIOUS. Though more or less this plant has a wild growth, the maximum height desirable for economic exploitation is 6 feet. The leaves sprout from the stem on all sides at the top of the plant and have their edges and ribs resembling something like saw teeth. In general, the leaves are thorny and the size of a good leaf, when stretched will be about 6 feet with a width of 2½" to 1". Screw-pines are generally planted on the borders of compounds also to serve as a good fencing.

Preparation of Raw Material

The leaves are cut from the plants with a sickle and the thorns on the edges resembling saw teeth are scraped with the aid of country knives. Again the leaves are split into two at the centre and rolls are made by winding the leaves round and round until a desired quality is obtained in an hexagonal roll. These rolls are allowed to be dried in the sun for a week or more. Generally preparation of the leaves is done during the summer months as during the rainy season it will be difficult to get the leaves dried properly. The dried leaves are again split into pieces according to the width required for making the mats. Before commencing the work of making mats the worker has to straighten the folded portion of the leaves by means of small stick.

Procurement and collection of raw Materials

The best season for collecting and storing screw-pine leaves is from October to December. Cutting is also done sparingly during July and August, depending on the growth of the plant. Those who grow the plants around their own compounds or fields cut the leaves according to their convenience and obtain them without extra cost while others have to pay for the same. Some pay an annual lease amount for securing the rights for cutting the leaves in an area. Certain others pay in a year stipulated amount for each cutting and there are only two flushings. There is another set of workers who purchase dried and prepared screw-pine rolls which cost one anna to 2½ annas each, according to the size of the roll and place where from it is purchased.

Range of manufacture

A number of articles are manufactured out of screw-pine such as mats for packing, sitting mats and fancy bags etc. They are mostly made by the women folk in the family assisted by children. The work is carried on by them along with the daily routine of household duties, There is no equipment required except knife for splitting the raw material.

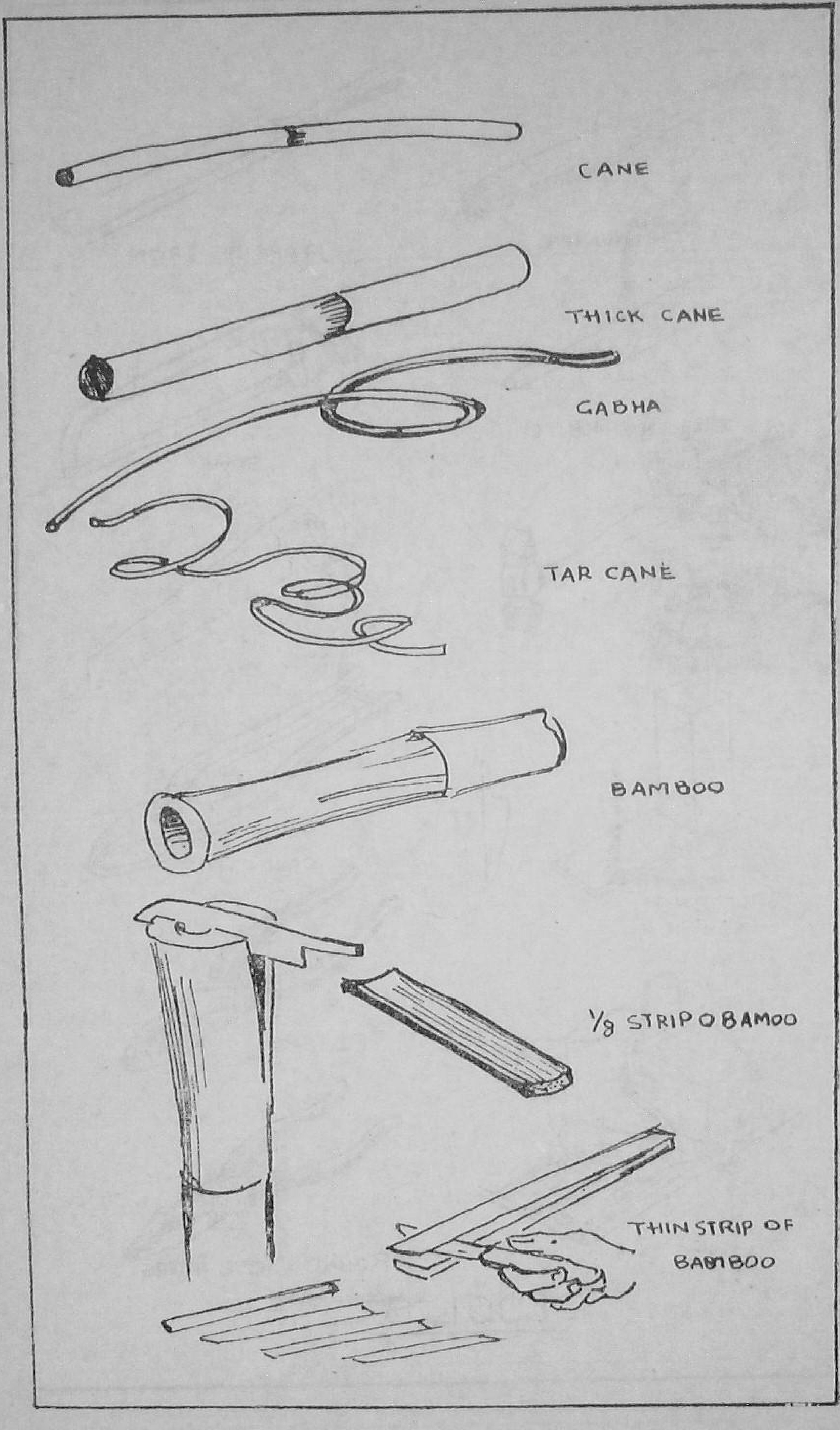
Process

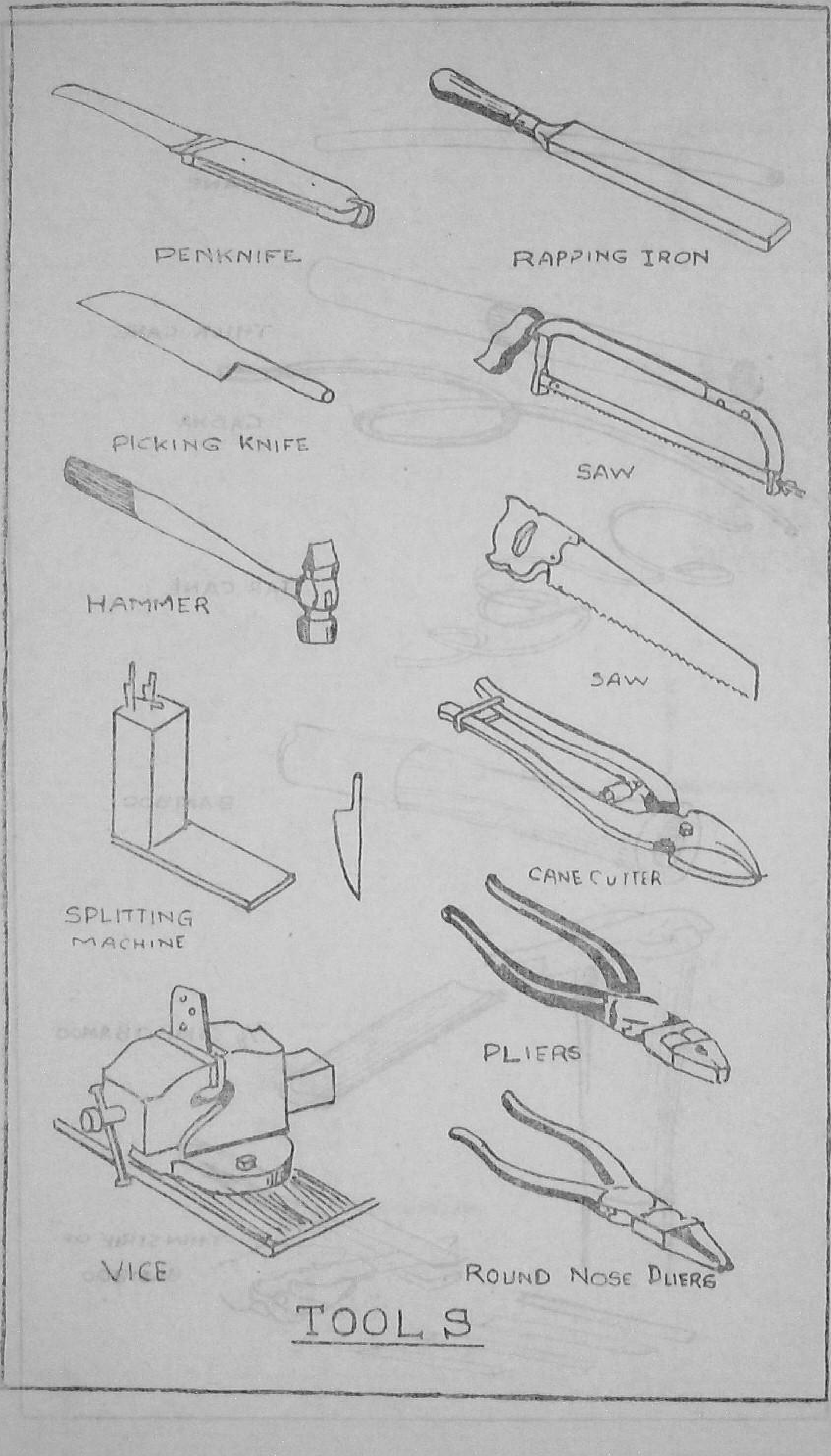
The mats are made from strips just like bamboo mats. Arrangements of the strips will be according to the designs, sizes and the quality of the mats to be produced.

LIST OF MACHINES, TOOLS AND EQUIPMENTS EMPLOYED IN GRASS MAT WEAVING INDUSTRY

Sl. No.	Description	Quantity	Drawing No.	Specifications and Functions	Price
(1)	(2)	(3)	(4)	(5)	(6)
Mat Weaving Looms					
1.	(*a*) Wooden or Iron pegs.	4	1	Each peg should be 1½′ long and ⅜″ in diameter. Pegs are fixed in the ground for setting up of the loom.	
	(*b*) Cotton for coir rope	2	2	Size of rope should be 3 yards long and ⅛″ in diameter. These are used for tightening the second warp bamboo.	
	(*c*) Bamboo pieces ..	2	3 & 4	Each bamboo should be 5′ long and 5″ in diameter. These are used as first warp bamboo and second warp bamboo.	
	(*d*) Bamboo piece ..	1	5	Size 4′ long and 4″ in diameter. It is used as lease rod.	
	(*e*) Bamboo pieces ..	4	6	Each bamboo should be 4½′ long & 3″ in diameter. One bamboo will be used as shed stick and the remaining three bamboos will be used for tripod stand to lift shed stick.	
	(*f*) Half cut bamboo piece.	1	7	Bamboo should be 4′ long and 4″ in diameter. It is used for pressing the shed.	Price of looms. Item I (*a*) to I(g) Rs. 30
	(*g*) Teak wood shuttles	2	8	Shuttles should be 4½″ long, 1″ wide and ½″ thick having hole at one end to convey grass.	
	(*h*) Wooden reeds ..	5	14	Reeds should be 4½′ long, 4″ wide and 1″ thick having 2, 3, 4, 5, and 6 holes per inch.	
	(*i*) Wooden sitting plank of teak wood.		12	Wooden planks should be 2½′ long, 6″ wide and 4″ thick. Mat weavers sit on this plank while weavng the mats.	
2.	Wooden plank ..	1	9	Soft wood plank 2½′ long 4″ wide and 4″ thick. It is used for extracting fibre out of ALOE plant.	Rs. 1·00

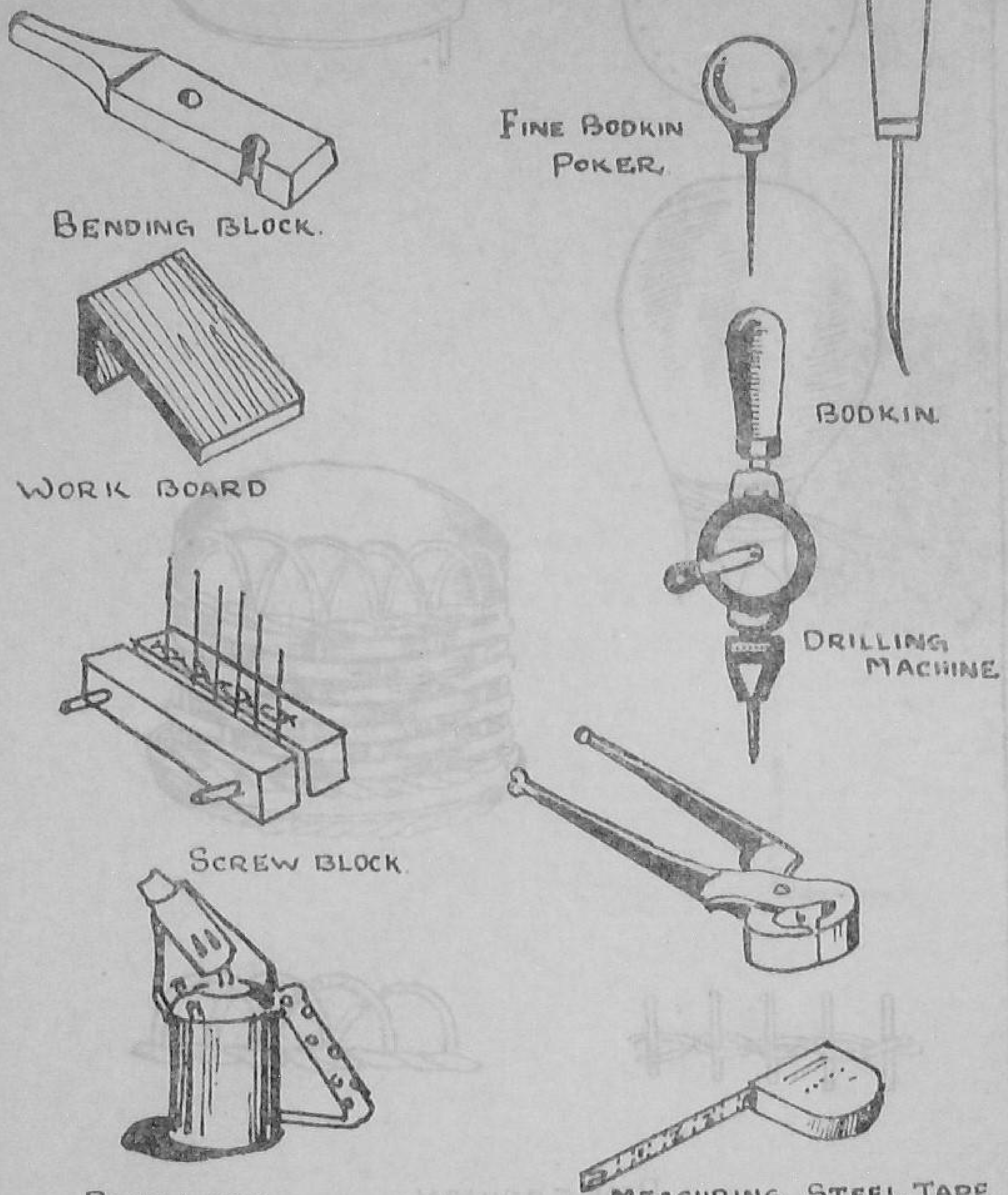
(1)	(2)	(3)	(4)	(5)	(6)
3.	Knife	1	10	The knife blade should be 4″ long. It should be tapered and have pointed end. It is used for splitting the grass.	Rs. 1·00
4.	Weaver's comb ..	1	11	The comb should be 3″ long, 1″ wide and 1/16″ thick. It is used for bringing the wefts to the required position.	Rs. 2·00
5.	Takli	1	13	It is used for twisting yarn.	Rs. 0·50
6.	Sickle	1	—	It is used for cutting grass.	Rs. 1·00
7.	Bamboo piece ..	1	—	Size 18″ × 2″. is used for extracting fibre from ALOE PLANT.	Rs. 0·25
8.	Weighing balance with set of weights.	2	—	They are required for weighing grass and material used in mats.	Rs. 100·00
9.	Pair of scissors ..	1	—		Rs. 3·00
10.	Tank with cement plaster.	1	—	Size 4′ long, 2′ wide and 3′ high. It is used for soaking wefts before weaving the mats used as water containers.	Rs. 20·00
11.	G. I. Buckets ..	2	—		Rs. 5·00
12.	Brass vessels	2	—	Each vessel should be of 6 gallons capacity. These are required for dyeing of grass.	Rs. 50·00
13.	Enamelled basins ..	2	—	They are required for dyeing of grass.	Rs. 10·00
14.	Enamelled bowls ..	4	—	They are required for dyeing of grass.	Rs. 3·00
15.	Spoons	4	—	They are required for dyeing of grass.	Rs. 6·00
16.	Wooden frame loom for mat weaving.	1	—		Rs. 300·00
17.	Hand operated Respader machine.	1	—	It is used for making Aloe fibre.	Rs. 200·00
18.	Electrically operated Respader machine complete with motor.	1	—	It is used for making Aloe fibre.	Rs. 800·00
19.	Hand operated fibre cleaning machine.	1	—	It is used for cleaning fibre.	Rs. 300·00
20.	Electrically operated fibre cleaning machine complete with electric motor.	1	—	It is used for cleaning fibre aloe.	Rs. 600·00

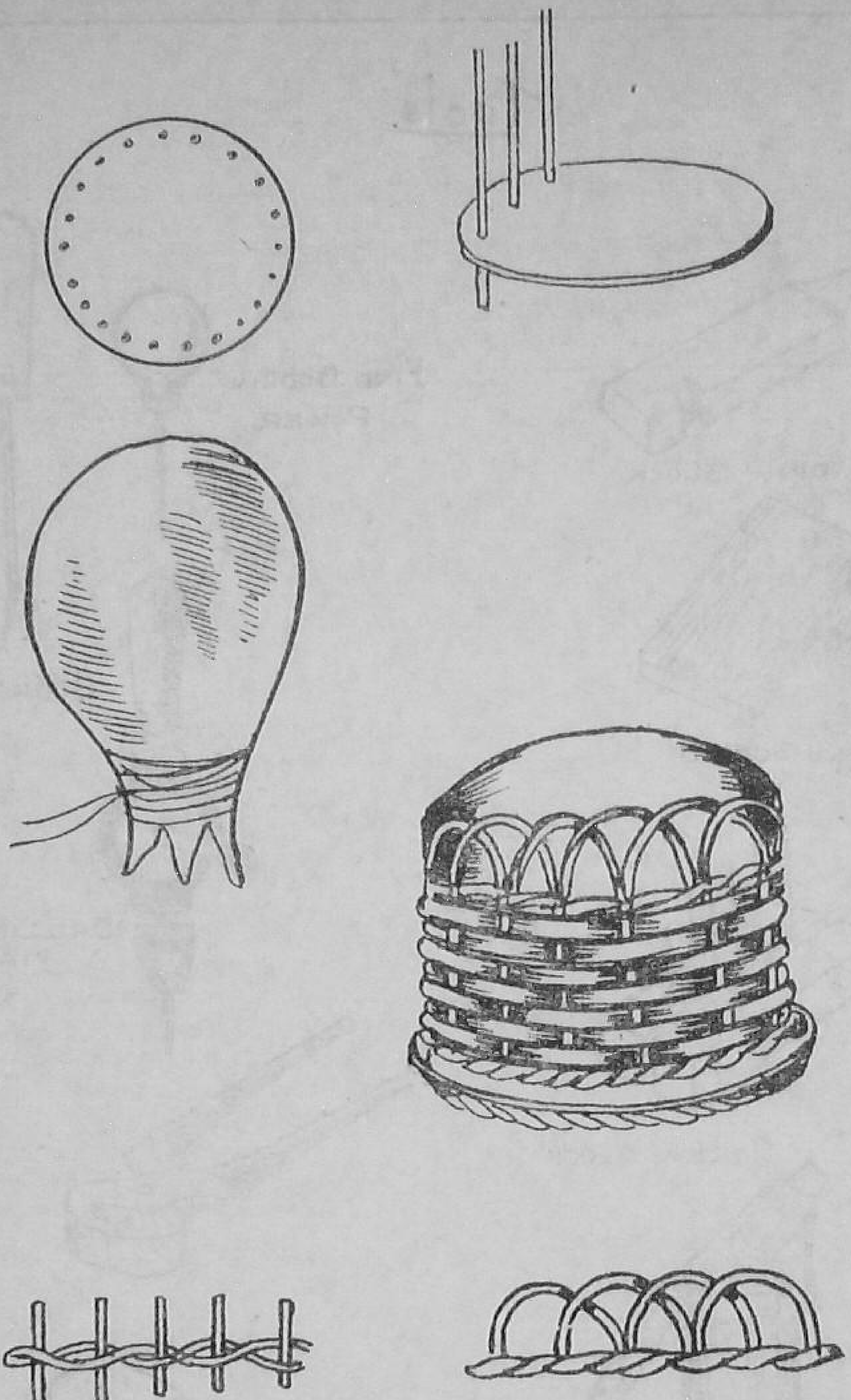

CANE
THICK CANE
GABHA
TAR CANE
BAMBOO
1/8 STRIP O BAMOO
THIN STRIP OF
BAMBOO


PENKNIFE
RAPPING IRON
PICKING KNIFE
SAW
HAMMER
SAW
SPLITTING MACHINE
CANE CUTTER
PLIERS
VICE
ROUND NOSE PLIERS

TOOLS

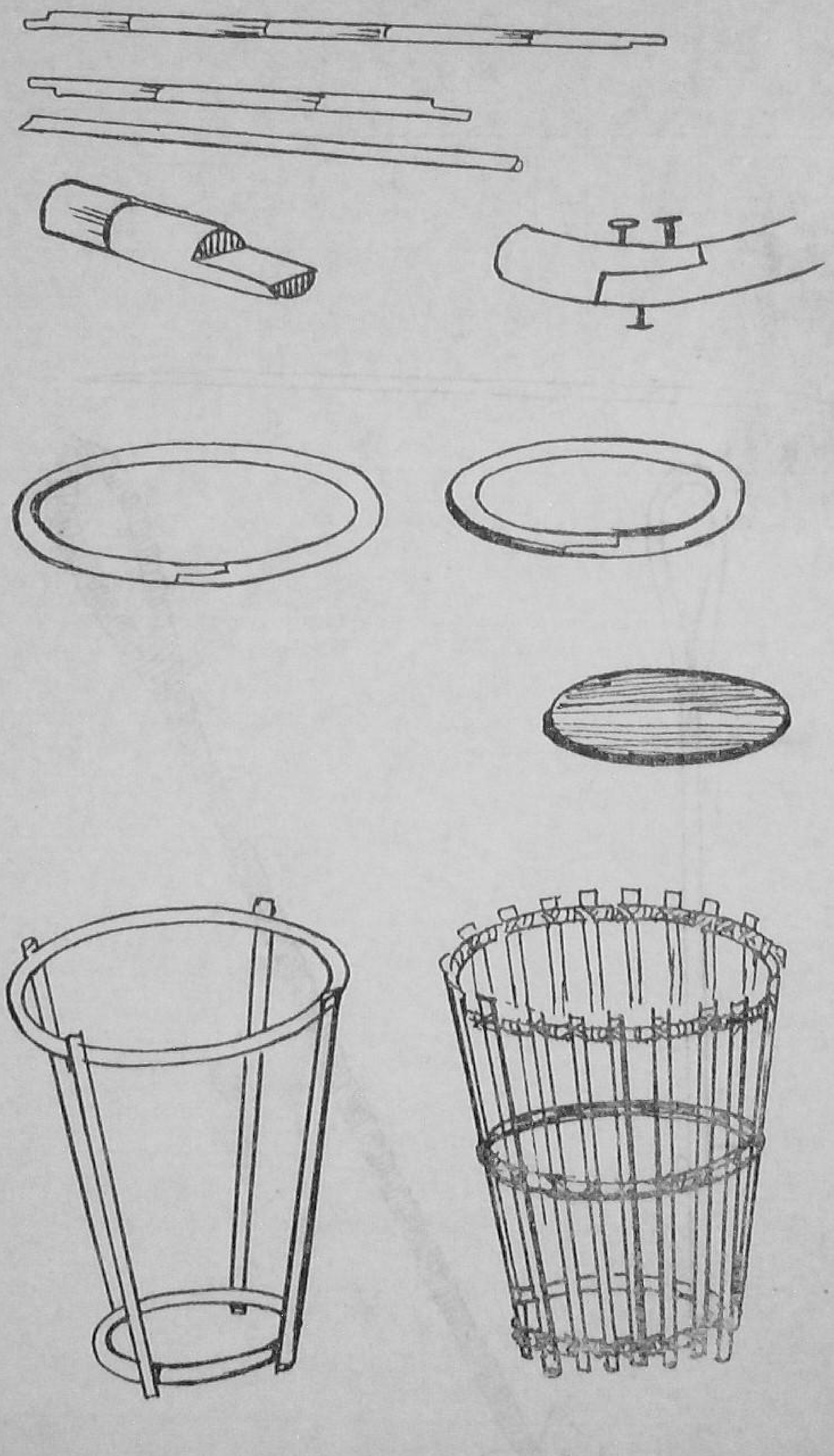
Tools


BENDING BLOCK.
FINE BODKIN
POKER.
BODKIN.
WORK BOARD
DRILLING
MACHINE.
SCREW BLOCK.
BLUE LAMP.
MEASURING STEEL TAPE.

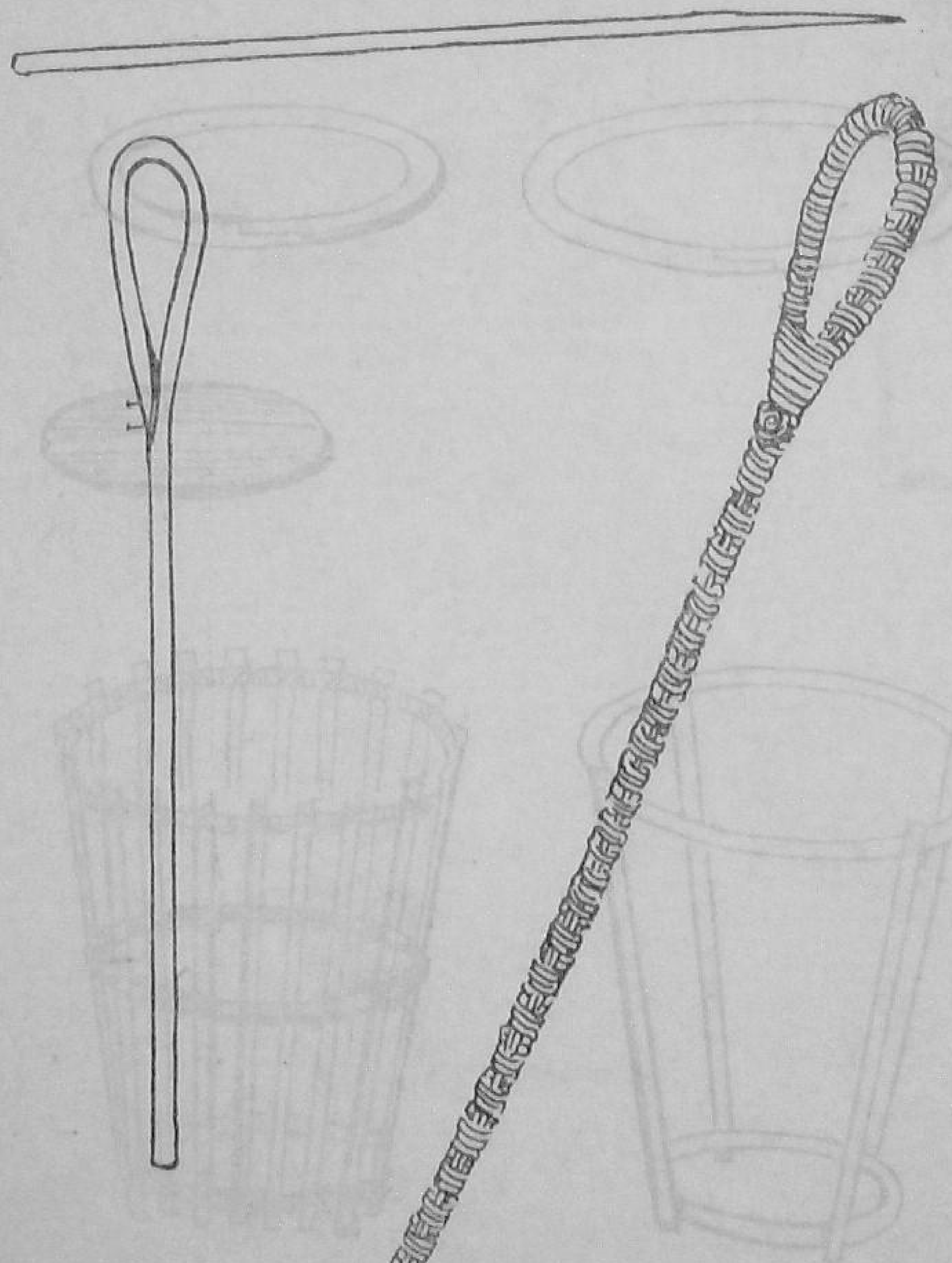


PIN CUSHION

WASTE PAPER BASKET No. 1.



WALKING STICK.



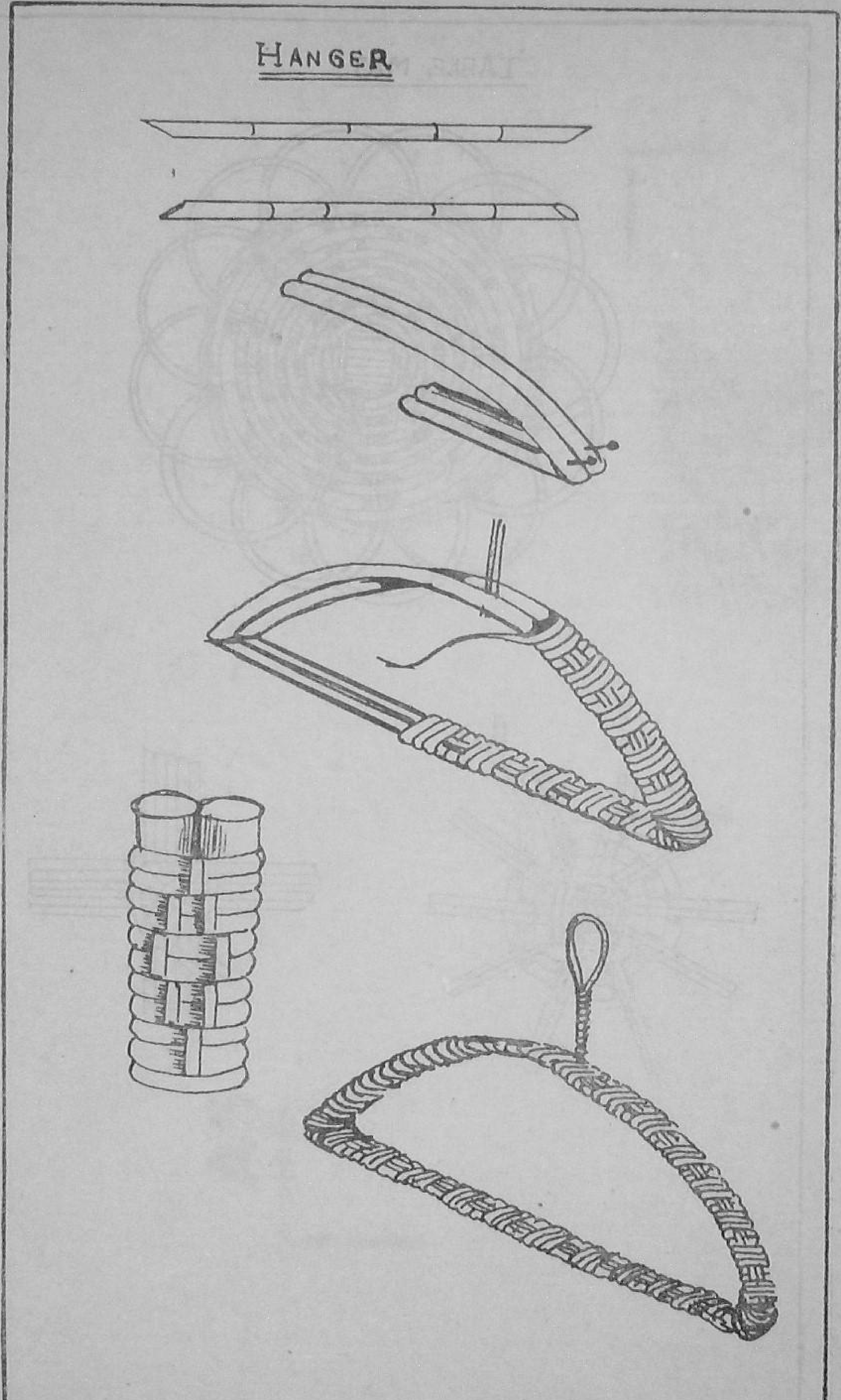
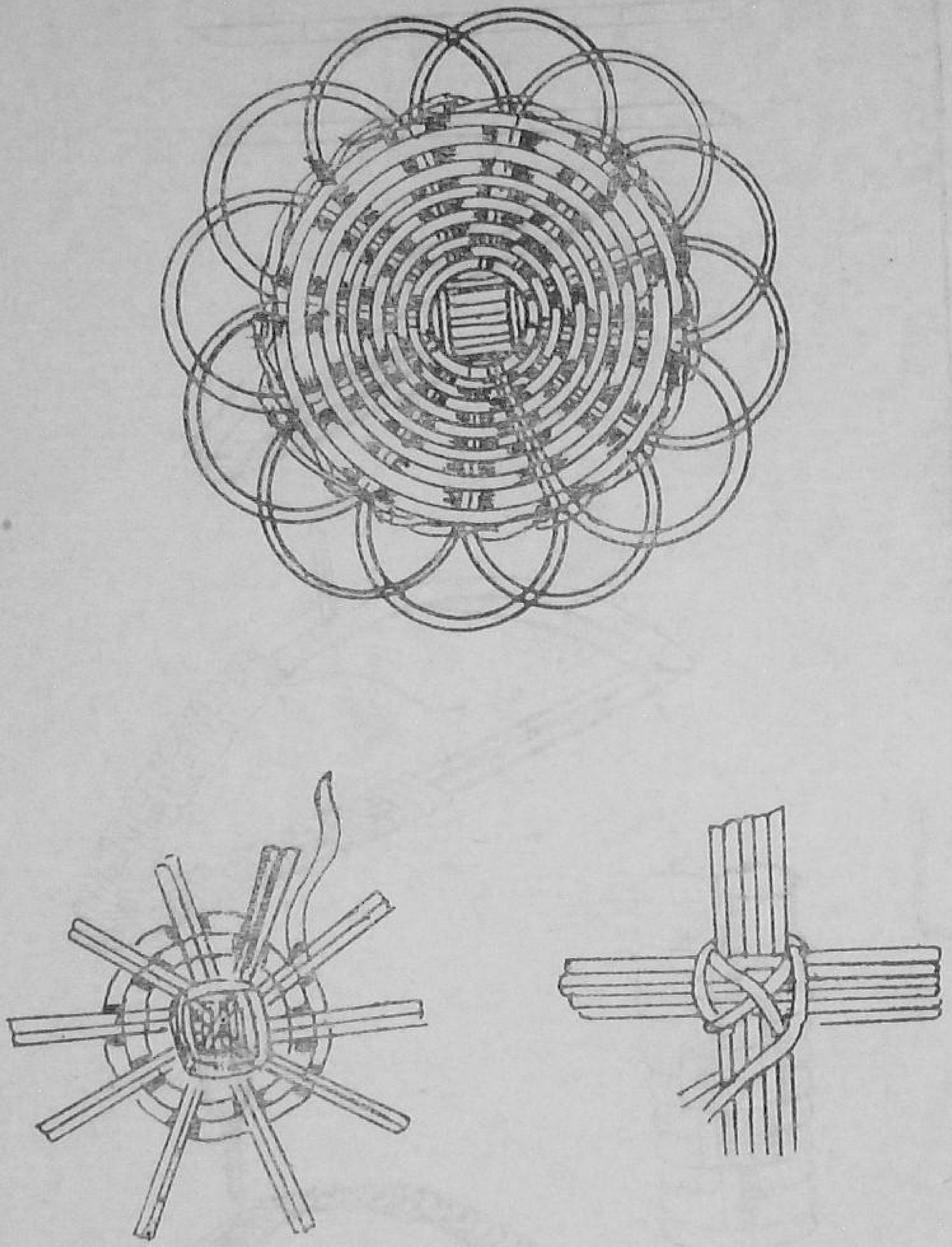
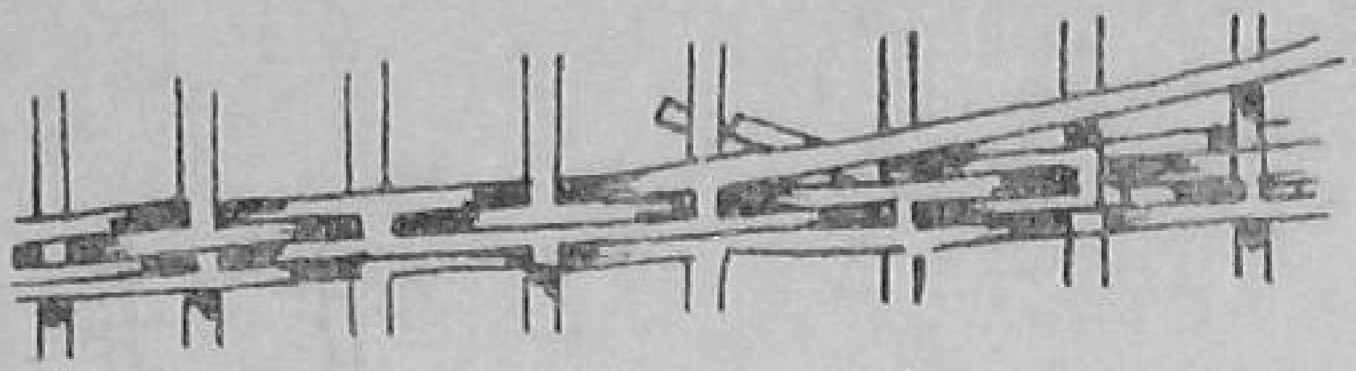

HANGER

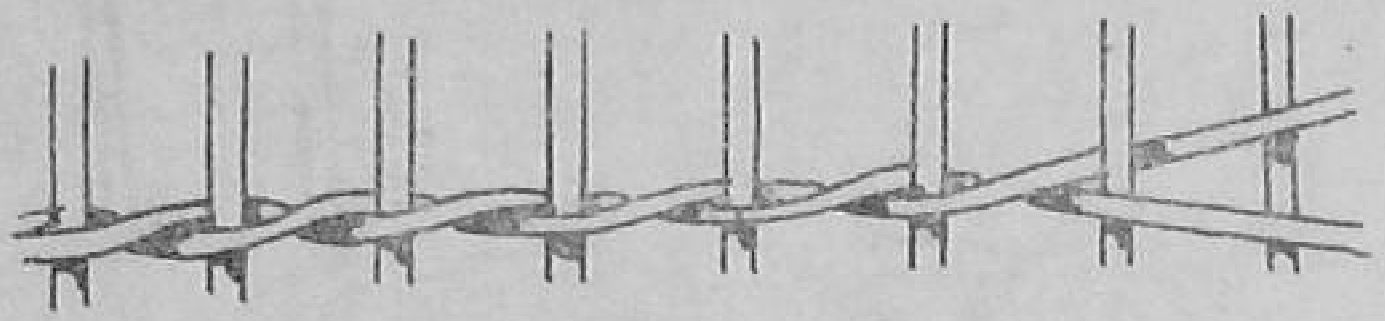
TABLE MAT



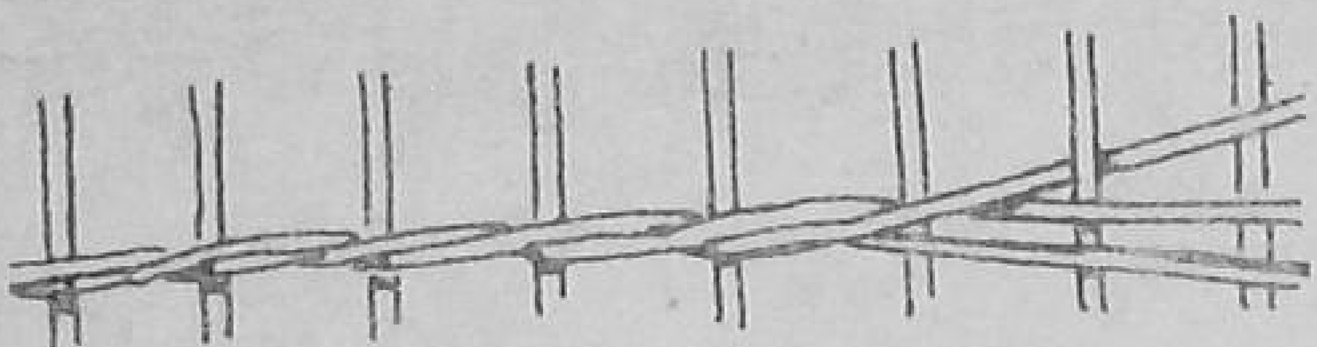
METHODS OF WEAVING



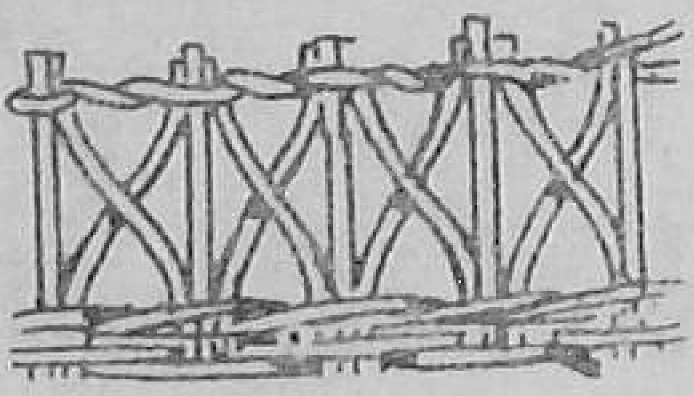
RANDING.



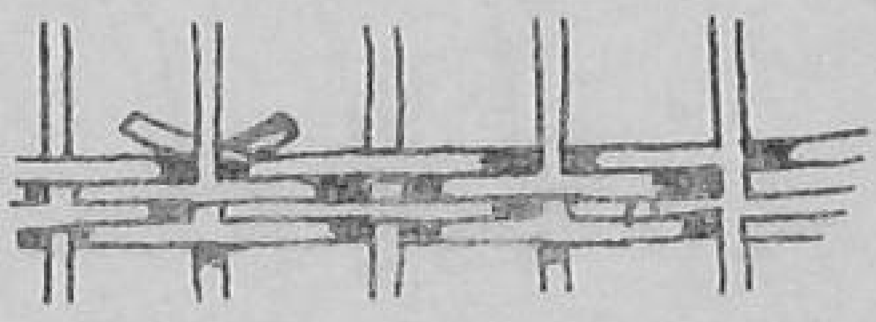
PAIRING



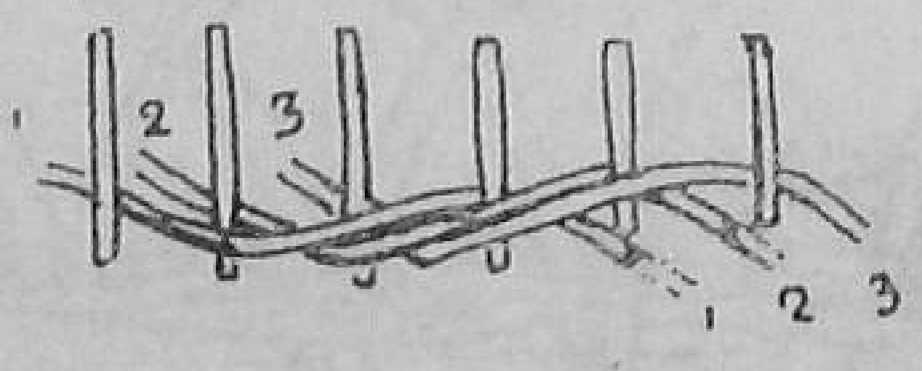
THREE ROD WALE.



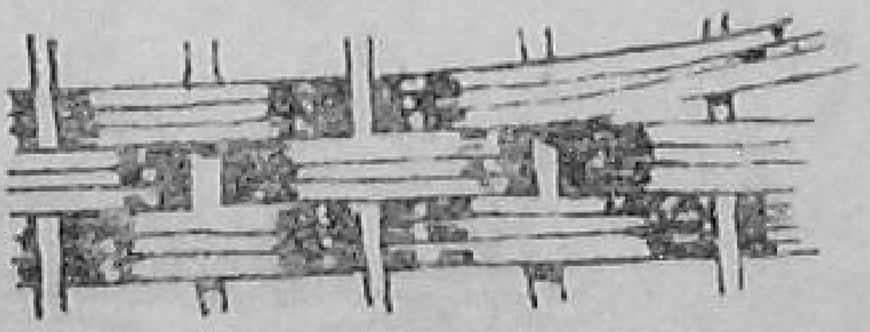
FITCHING.



JOINING.

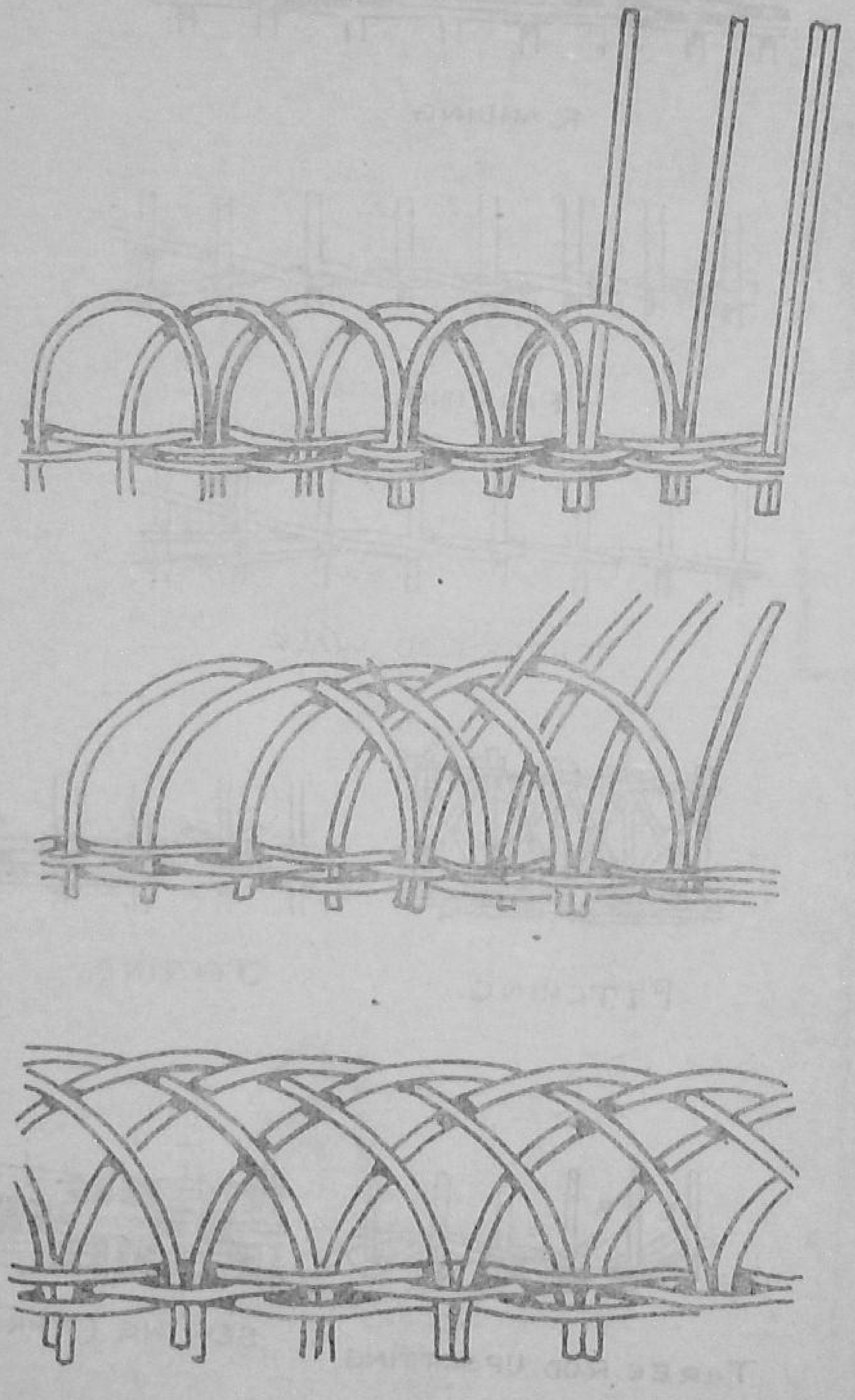


THREE ROD UPSETTING.

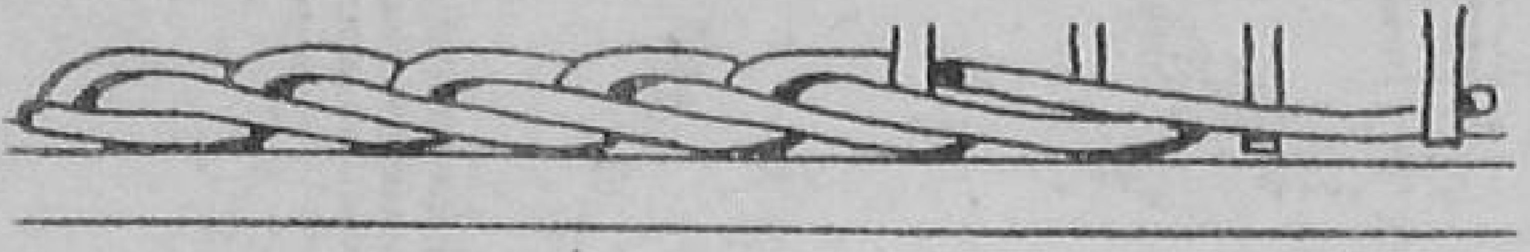


SEWING (THREE ROD)

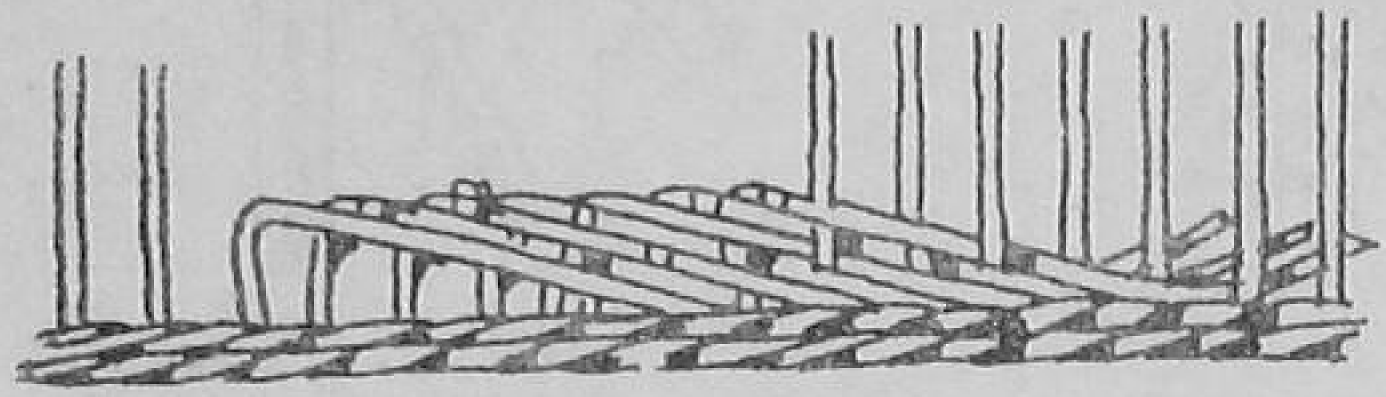
THREE TYPES OF SCALLOP BORDERS.



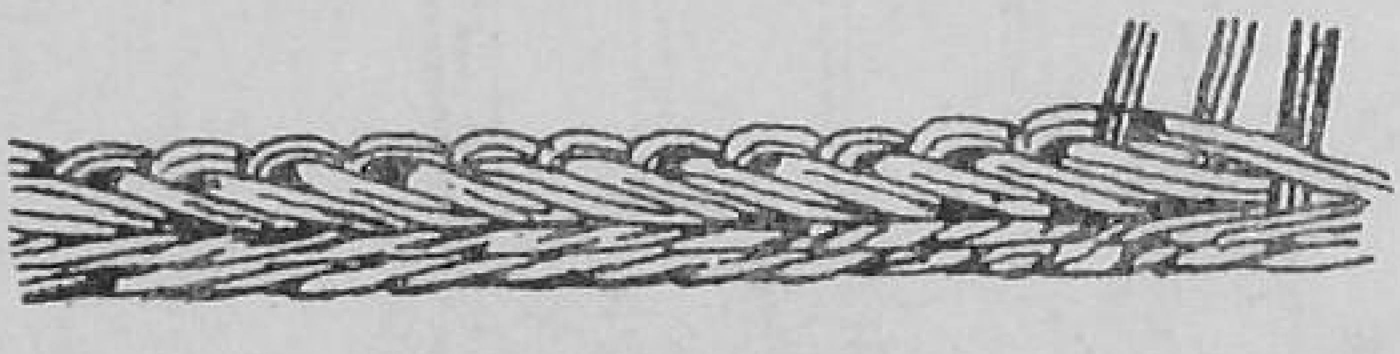
VARIOUS TYPES OF BORDERS.



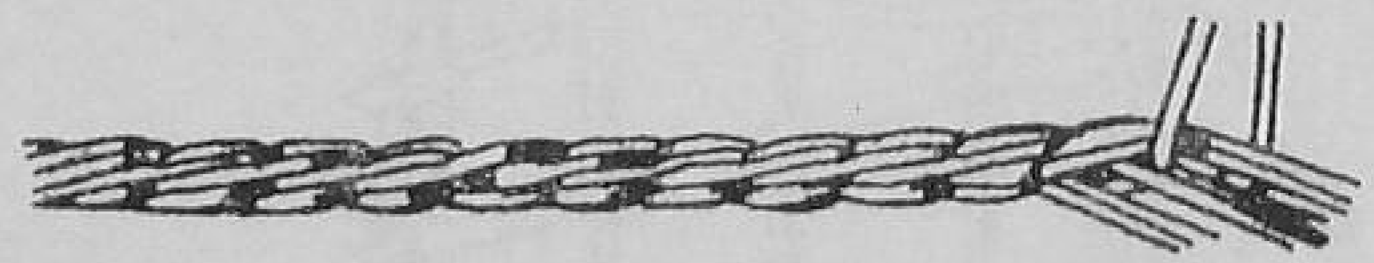
SIMPLE TRACK BORDER



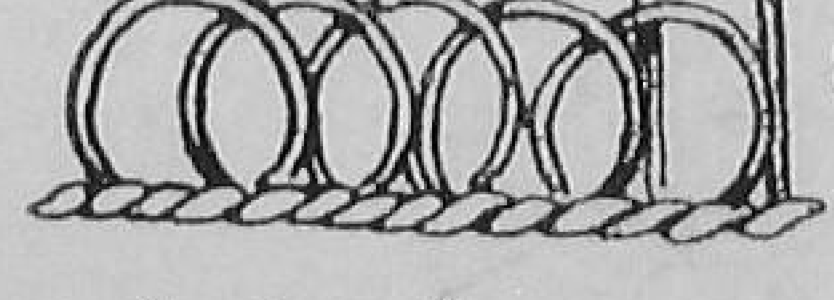
ANOTHER TRACK BORDER



TRACK BORDER WITH DOUBLE STAKES



THREE ROD-BEHIND-ONE PLAIN BORDER.

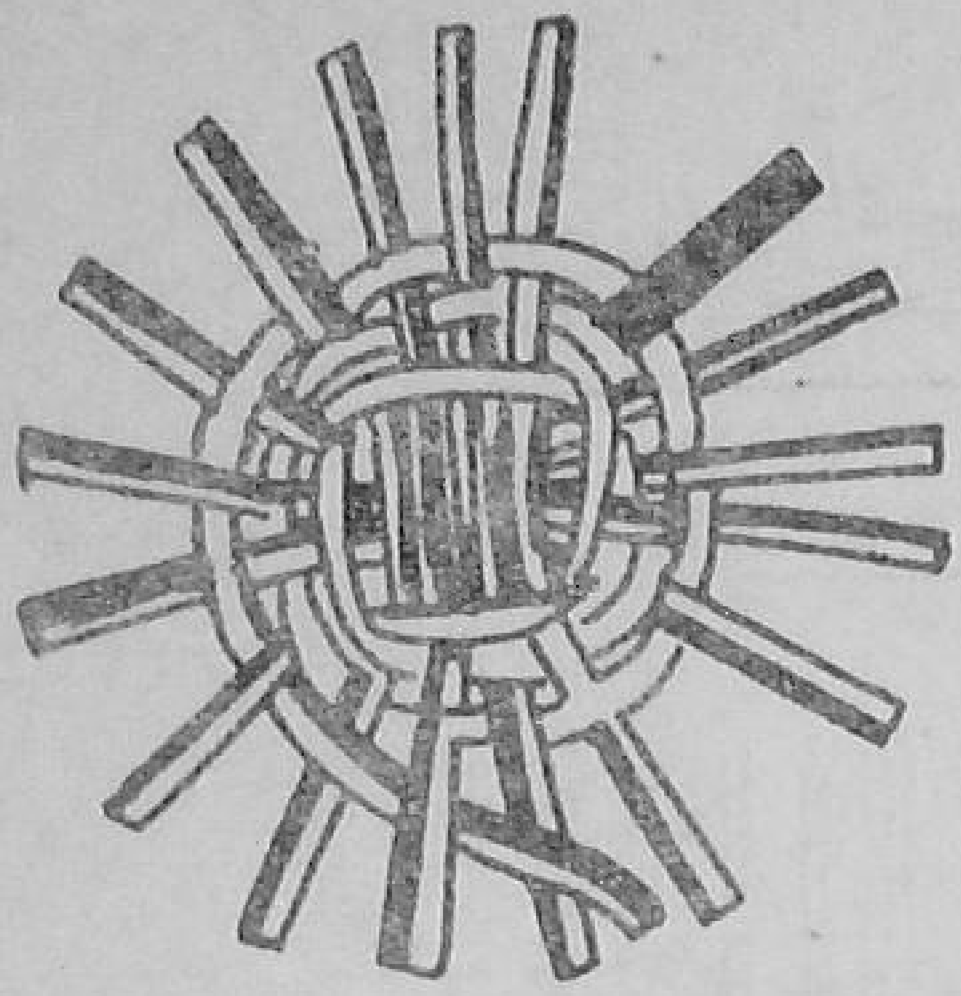


SIMPLE SCALLOP BORDER.

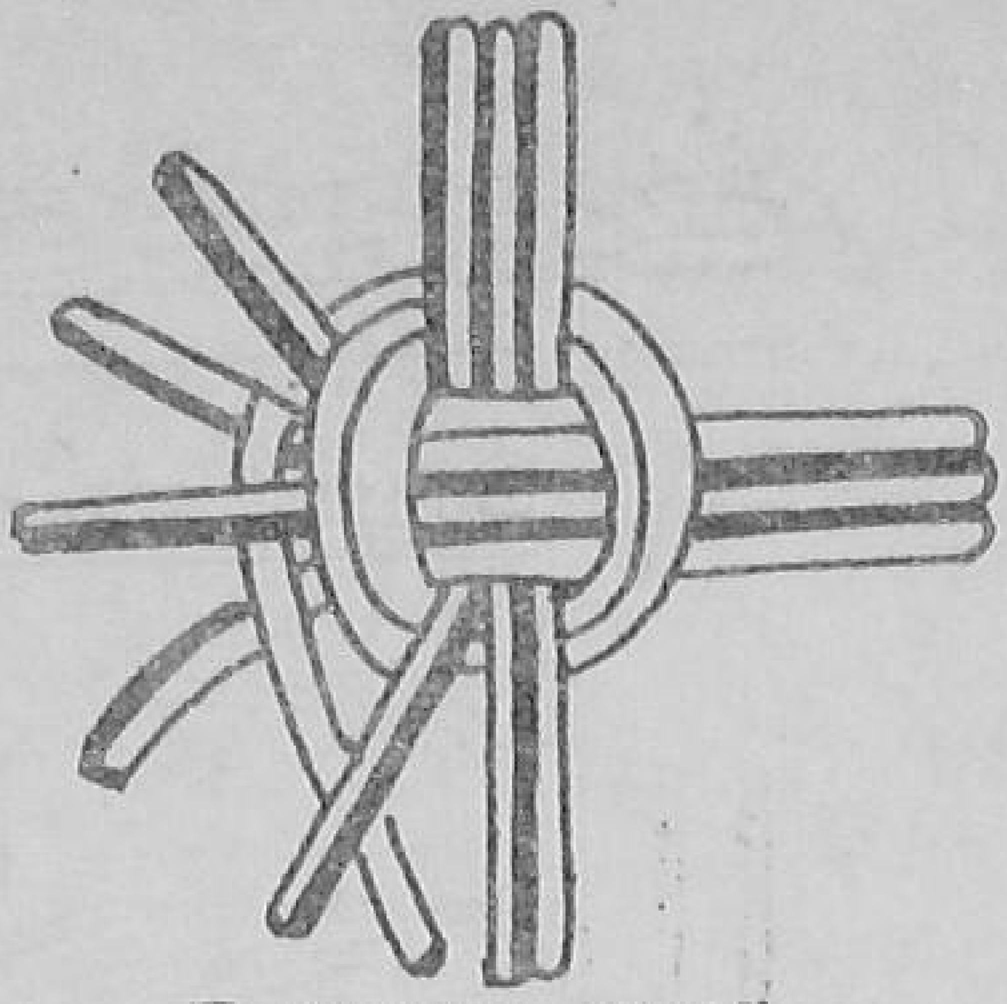
TWO ROD, THREE STROKE PLAITED BORDER.

1 9CD&G/62—7

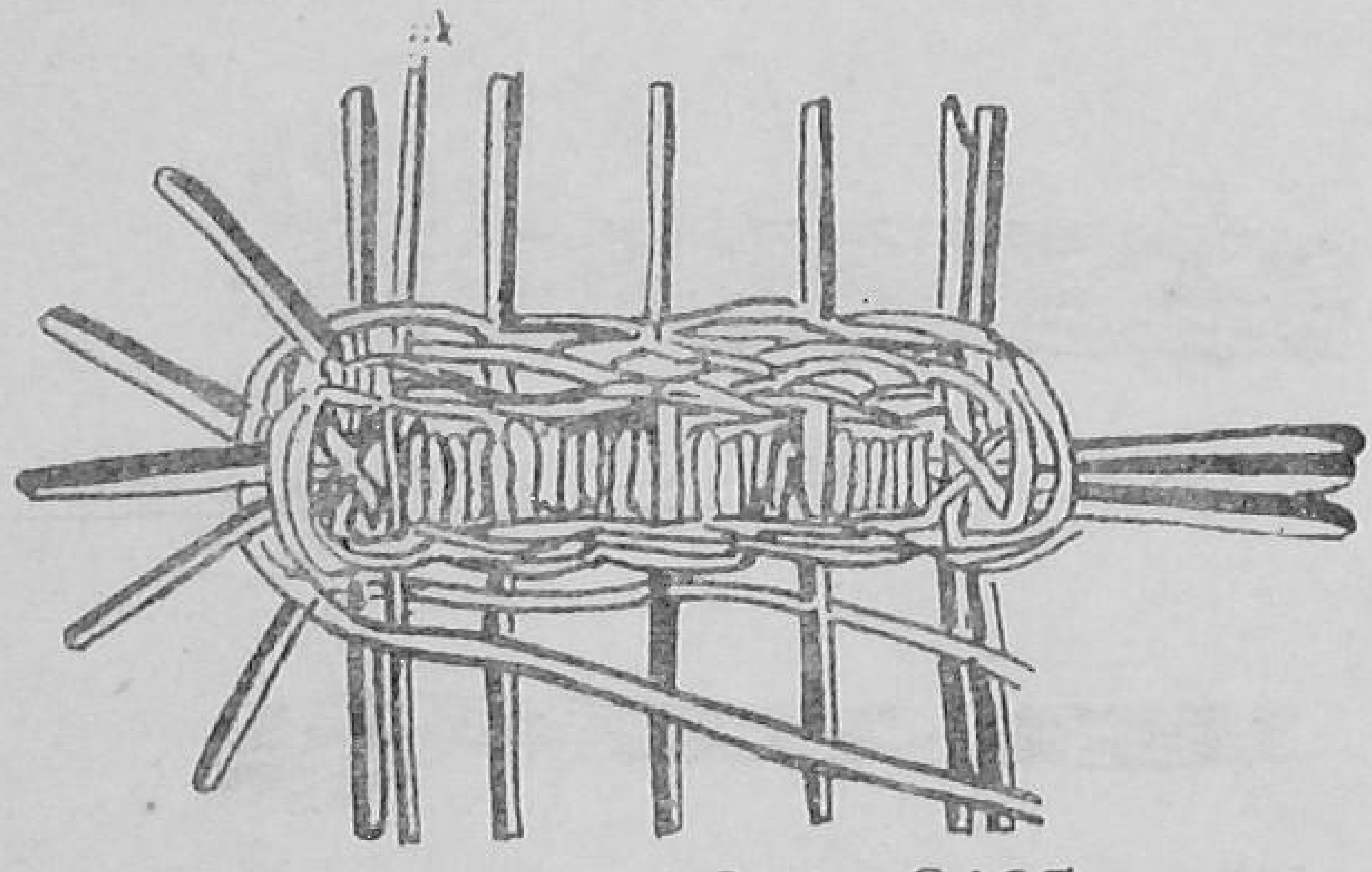
VARIOUS TYPES OF BASES.



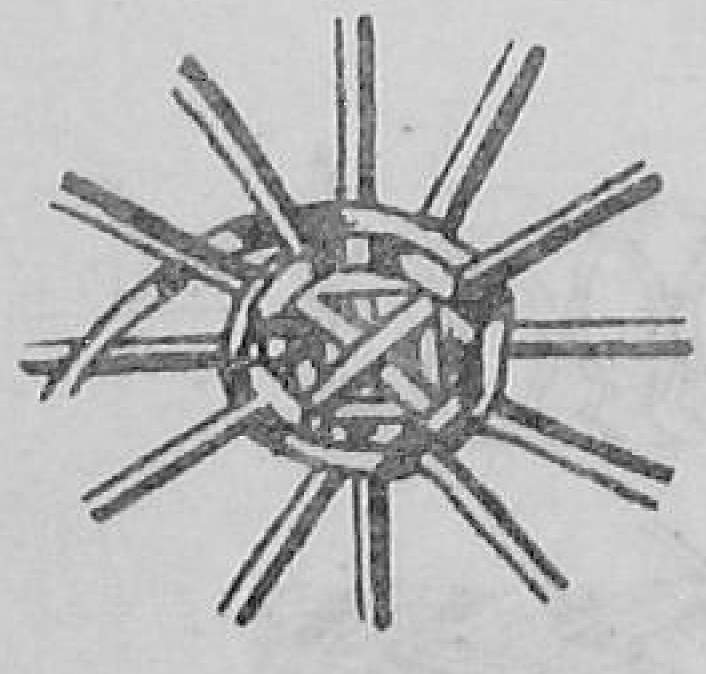
ROUND



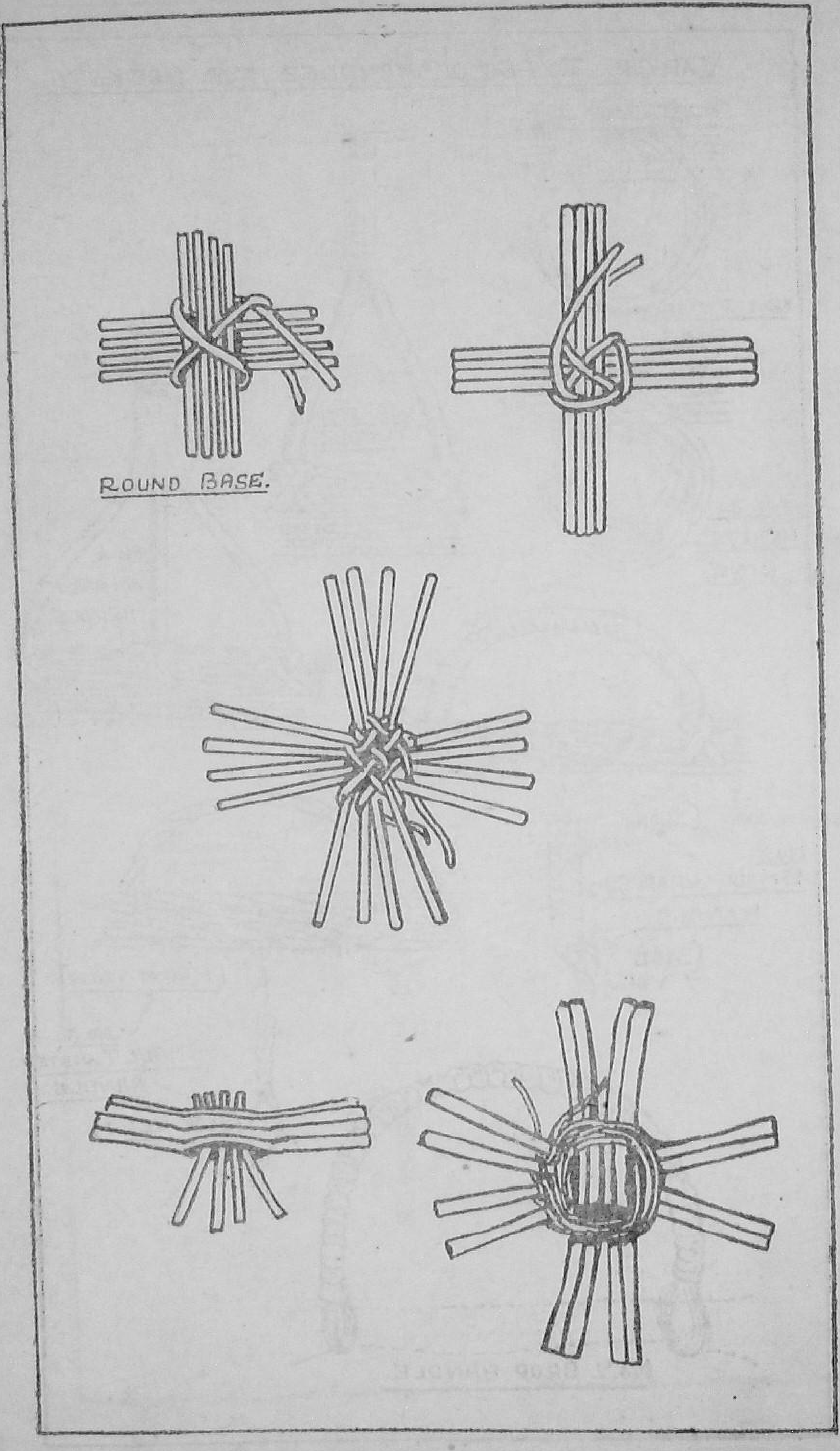
RANDED BASE.

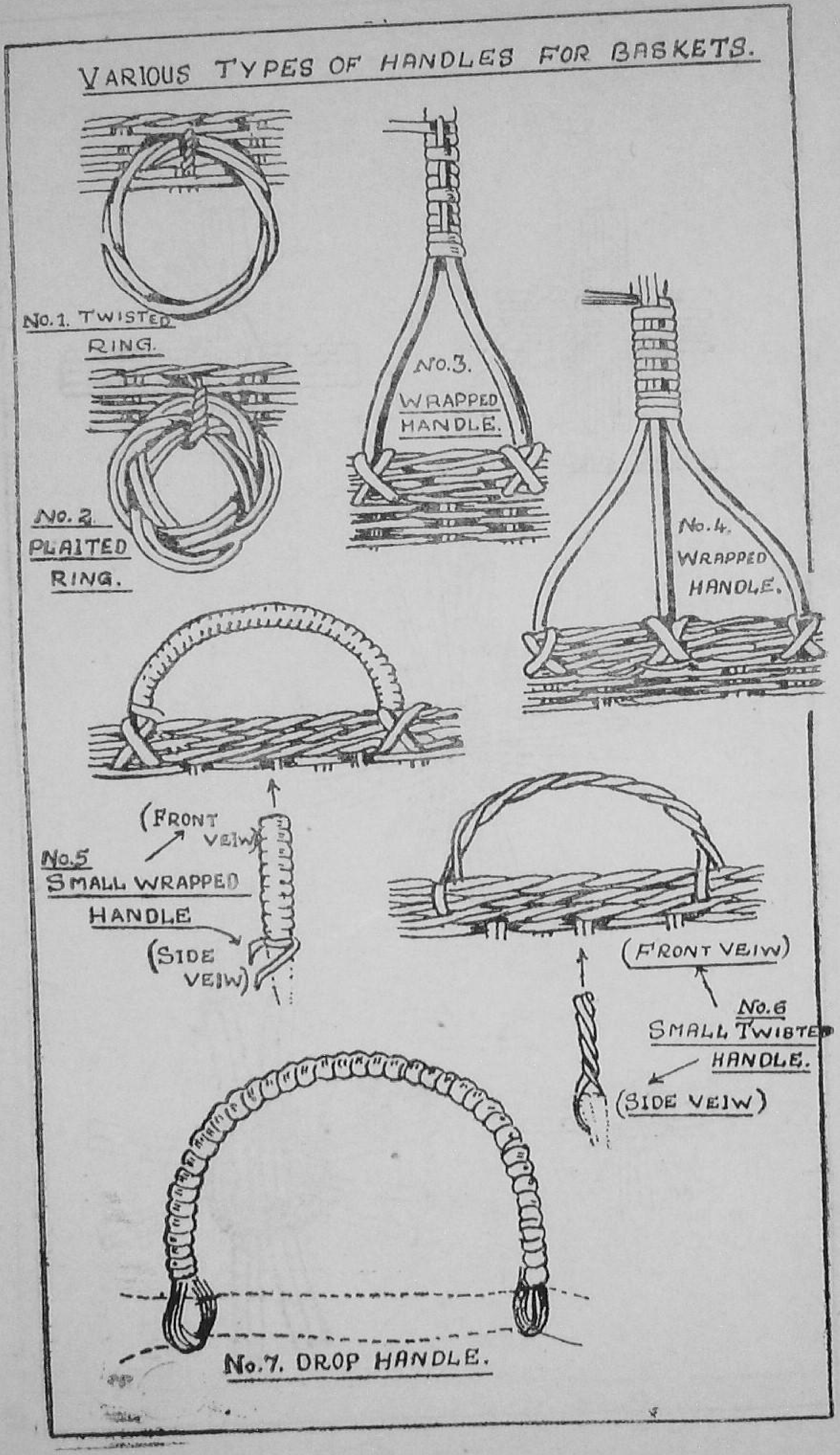


OVAL BASE.

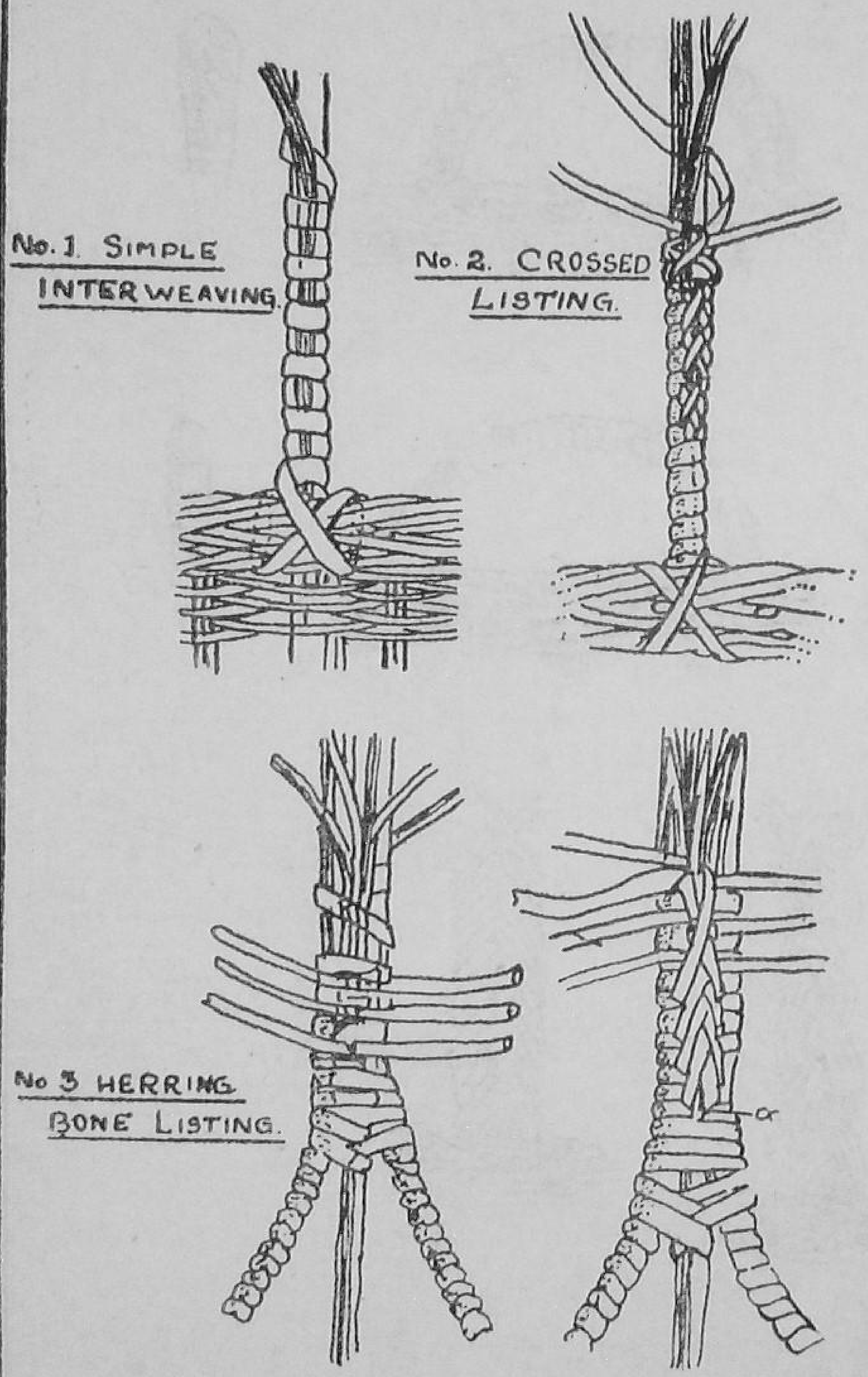


ROUND BASE.

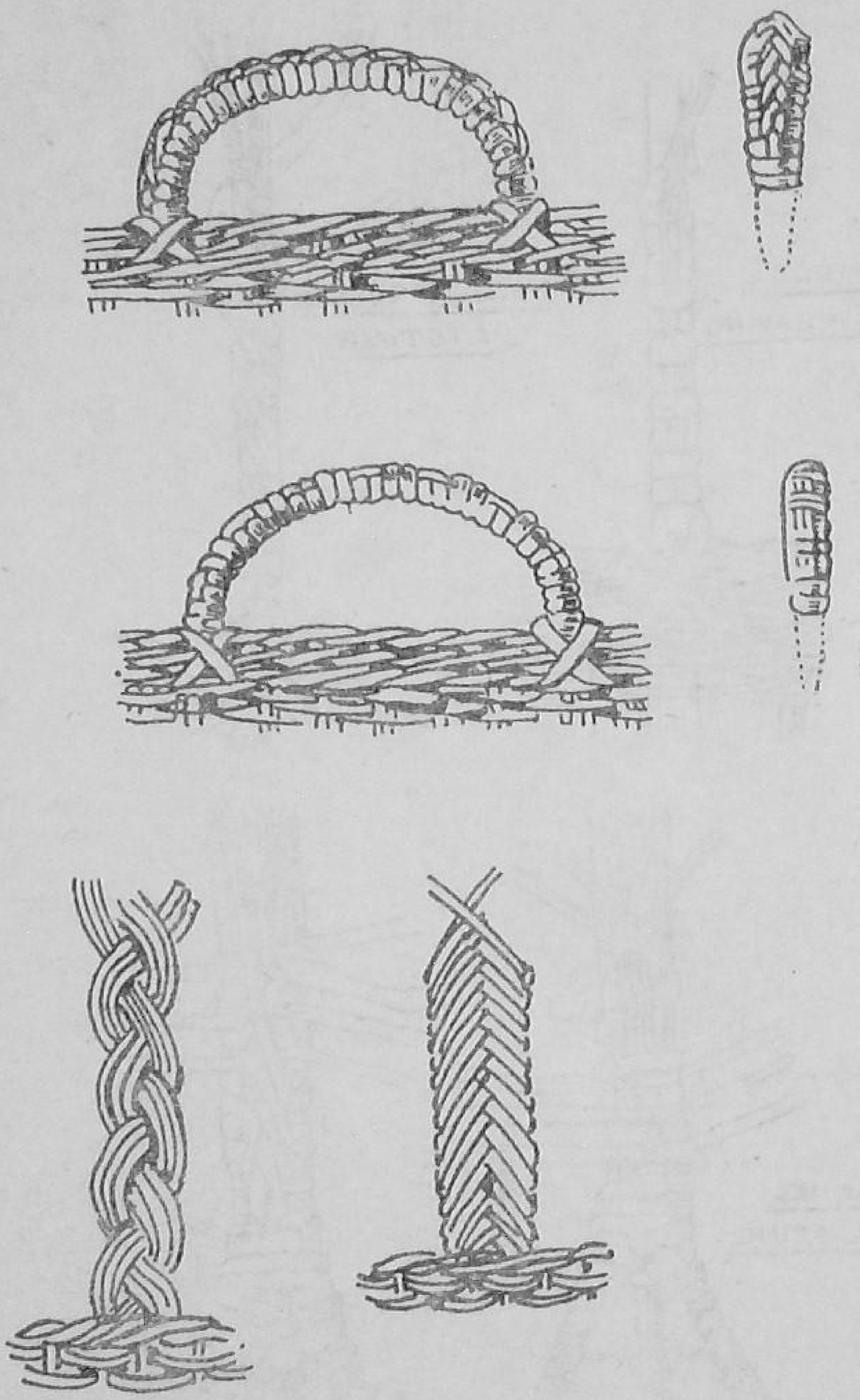

ROUND BASE.


VARIOUS TYPES OF HANDLES FOR BASKETS.
No.1. TWISTED RING.
No. 2. PLAITED RING.
No.3. WRAPPED HANDLE.
No.4. WRAPPED HANDLE.
(FRONT VEIW)
No.5 SMALL WRAPPED HANDLE
(SIDE VEIW)
(FRONT VEIW)
No.6 SMALL TWISTED HANDLE.
(SIDE VEIW)
No.7. DROP HANDLE.

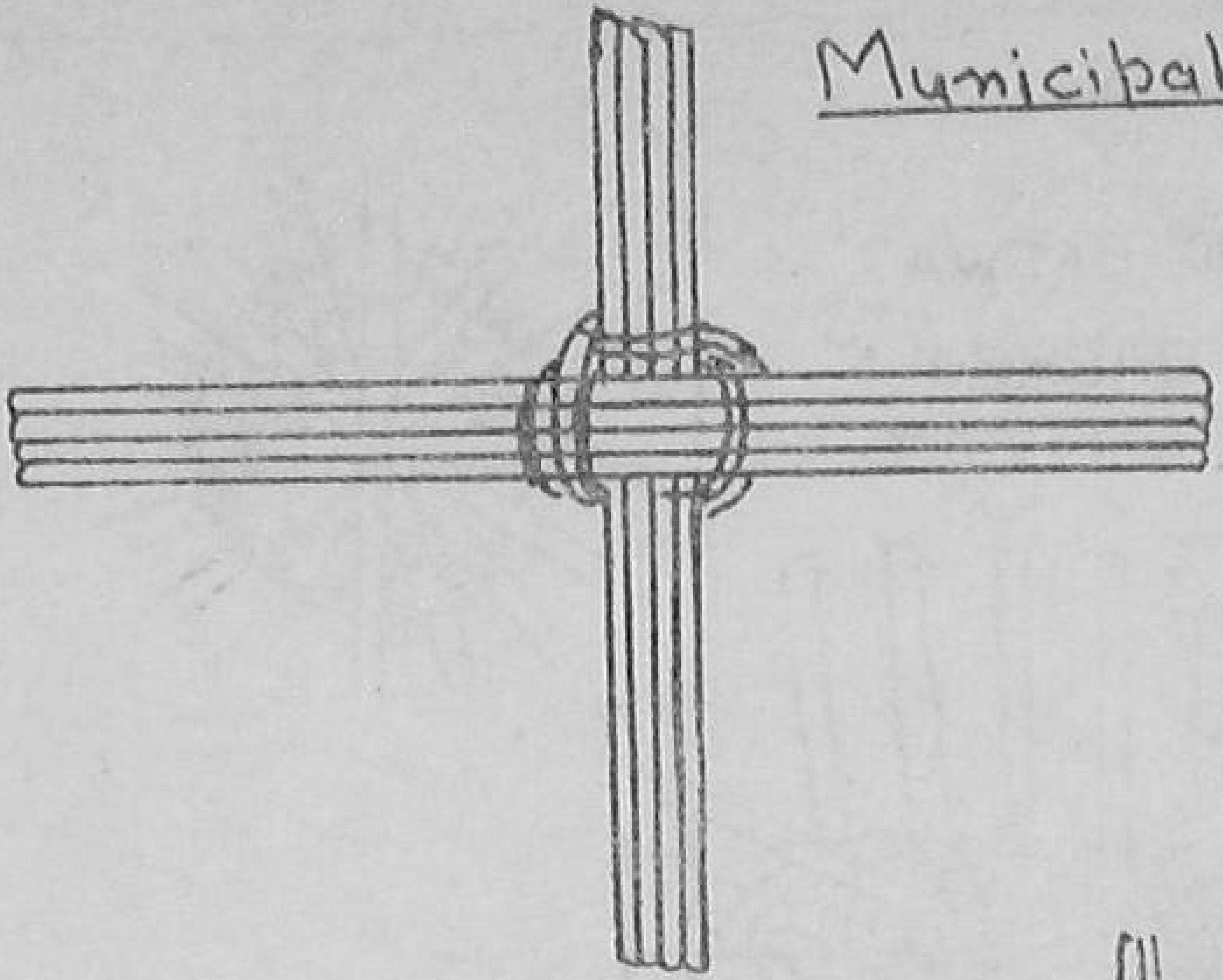
THREE TYPES OF LAPPED HANDLES.

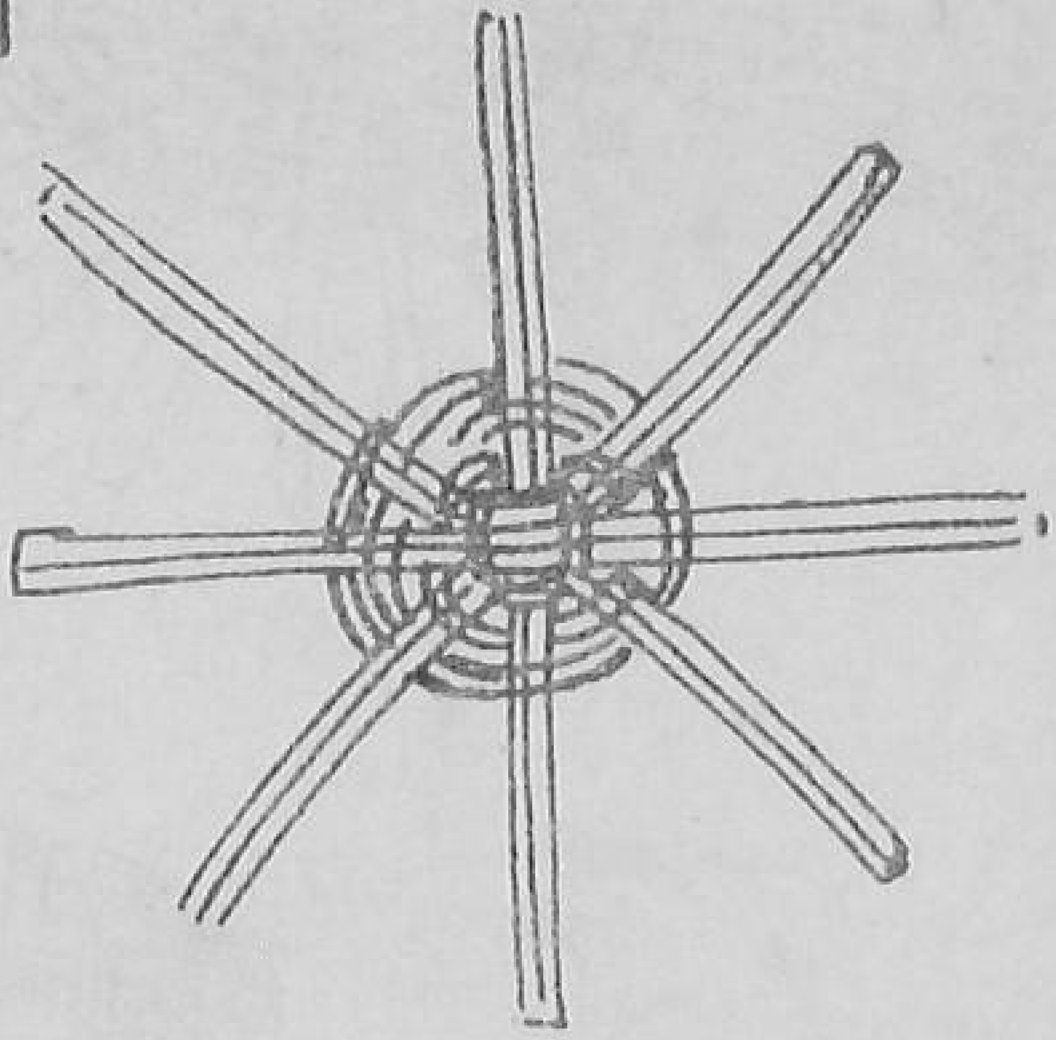


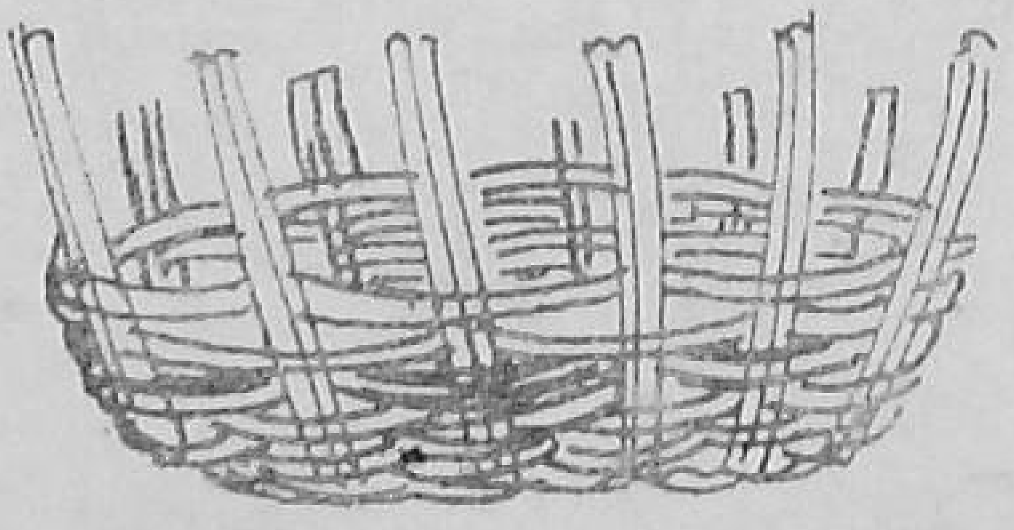
HANDLES

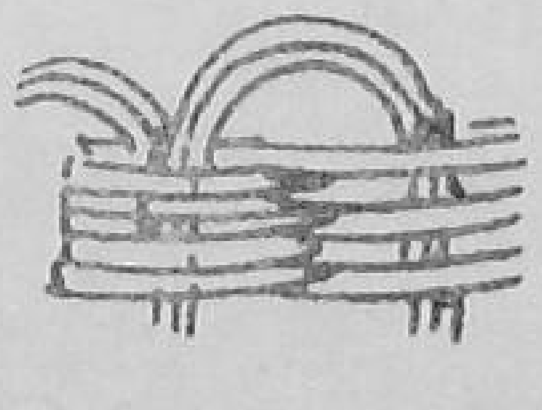


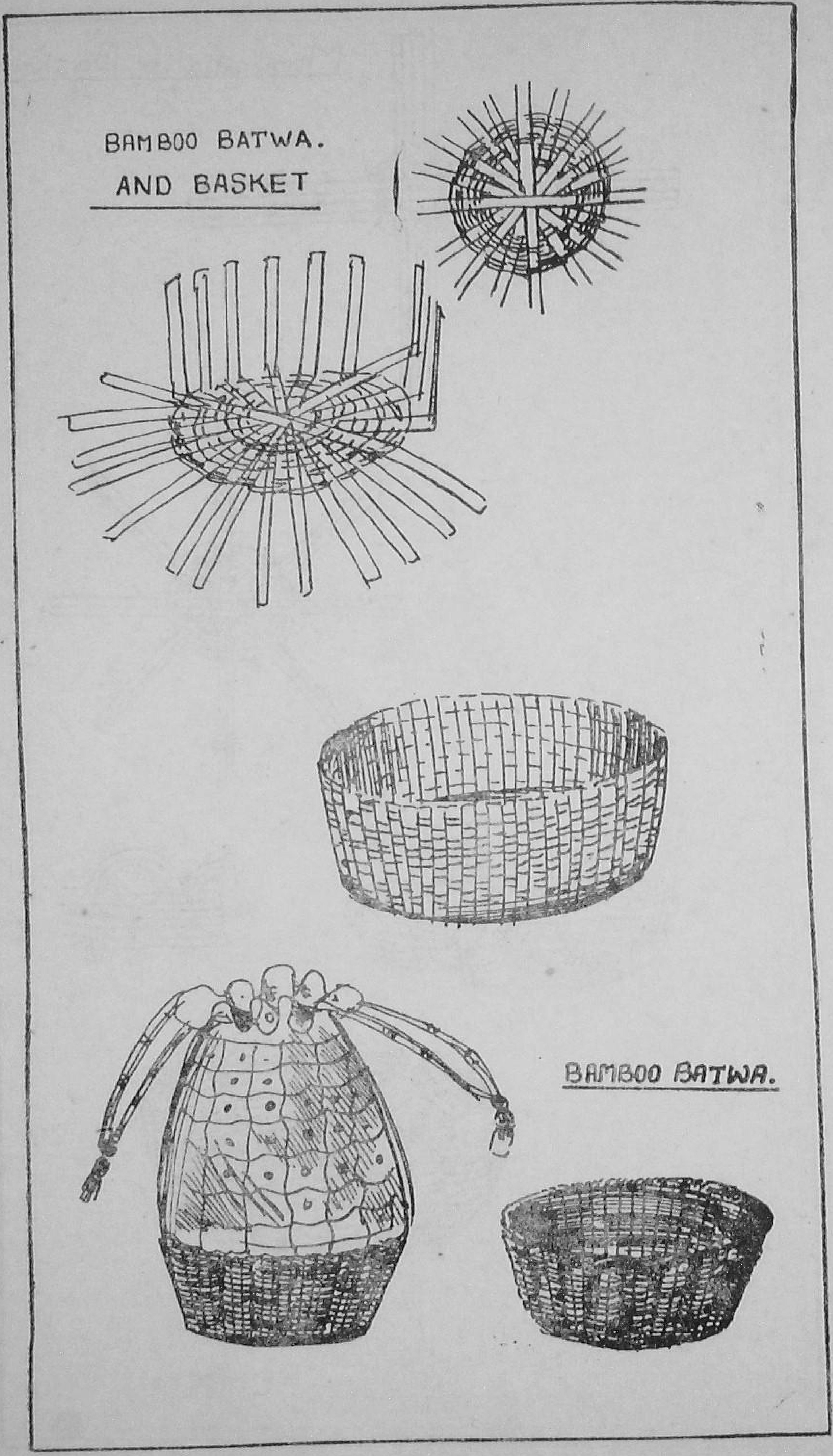
Municipality Basket

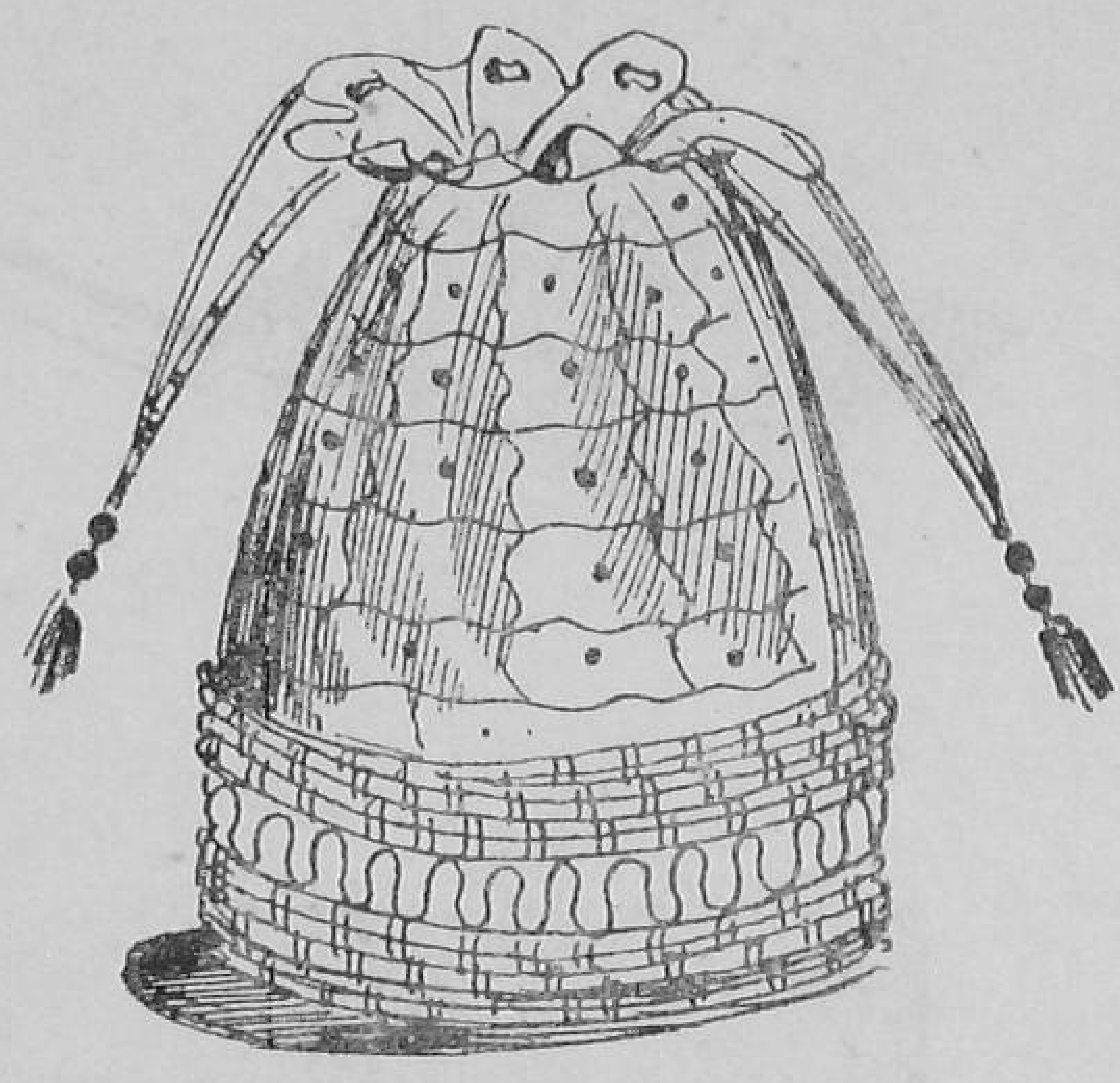




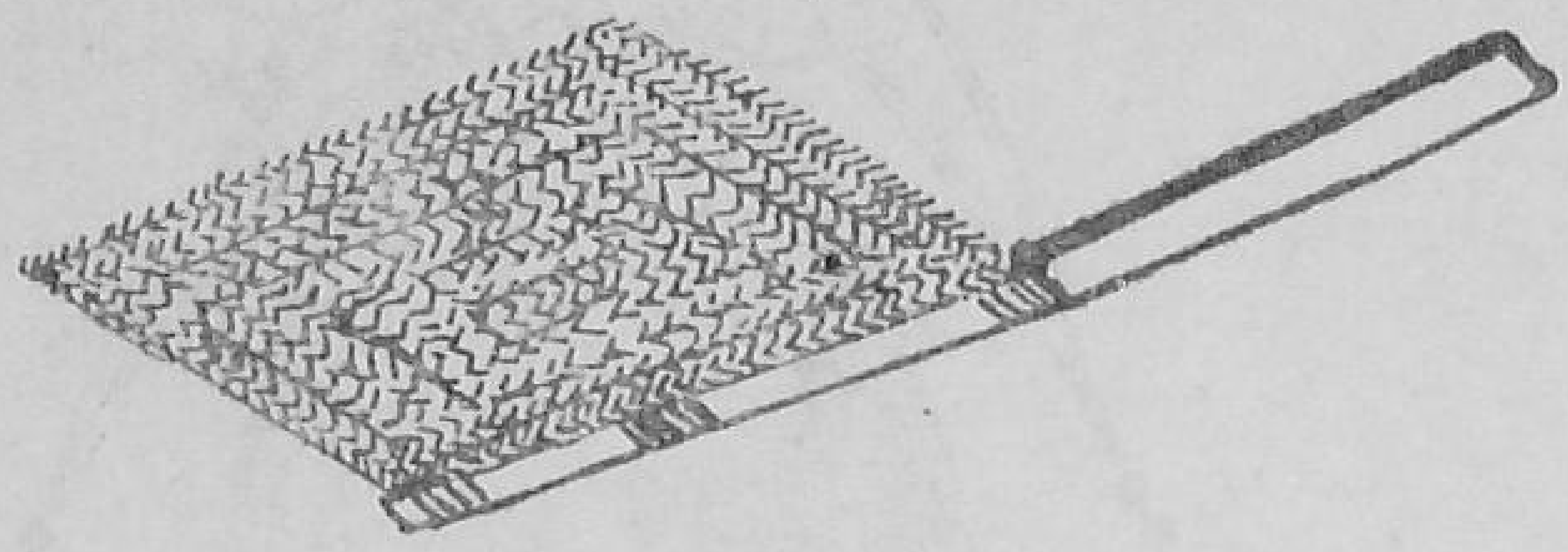




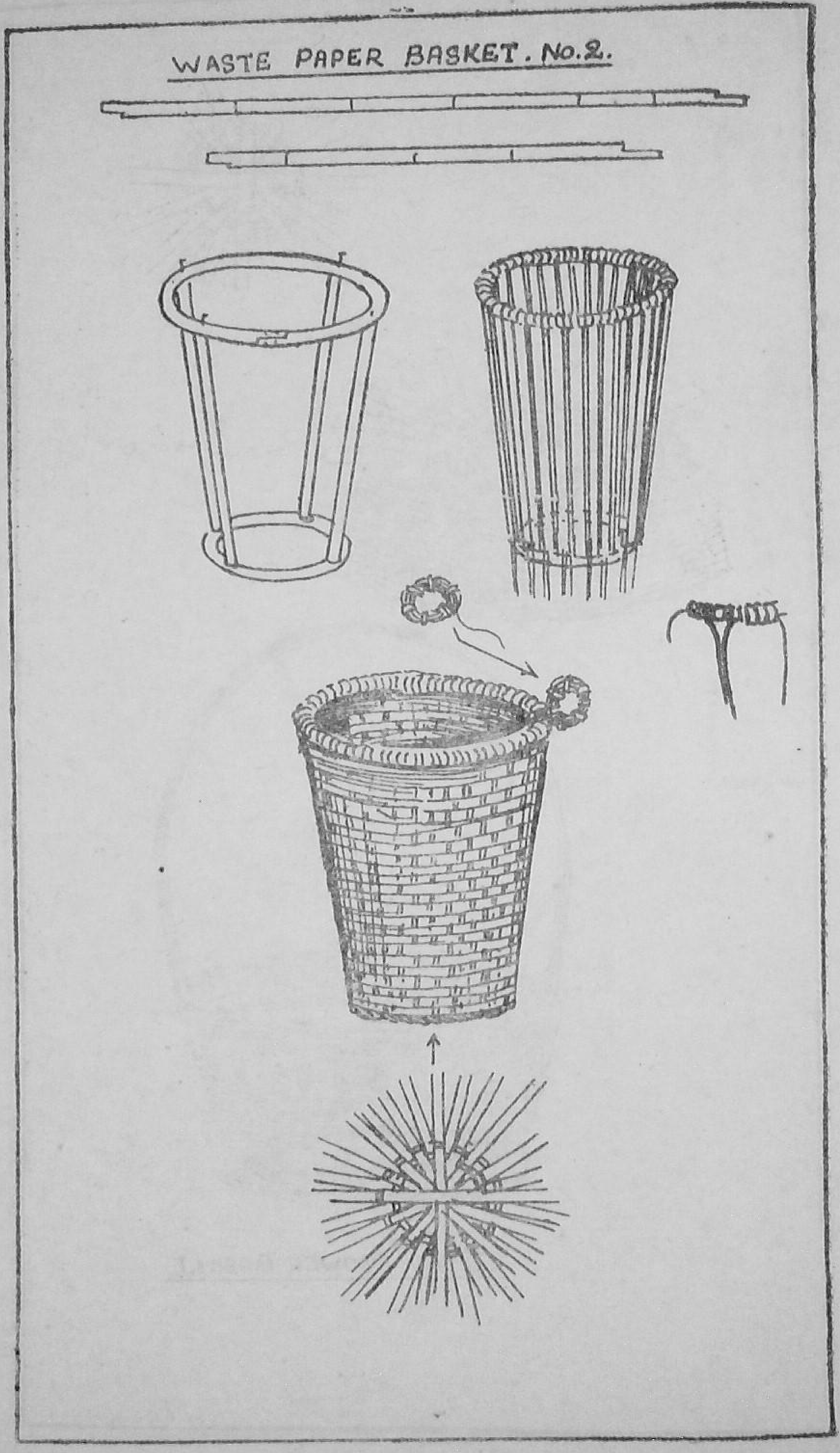

BAMBOO BATWA.
AND BASKET
BAMBOO BATWA.

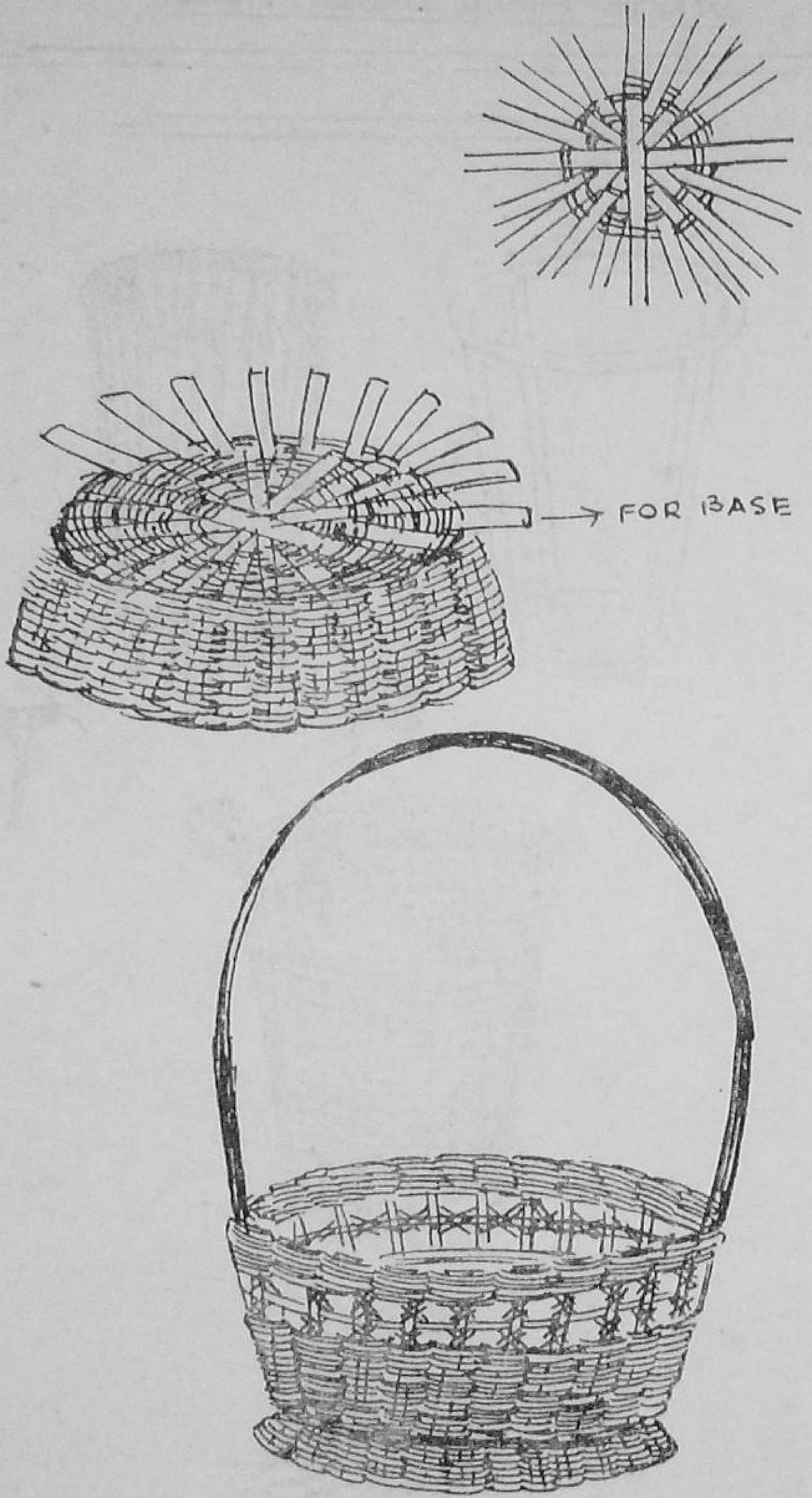


ROUND BATWA

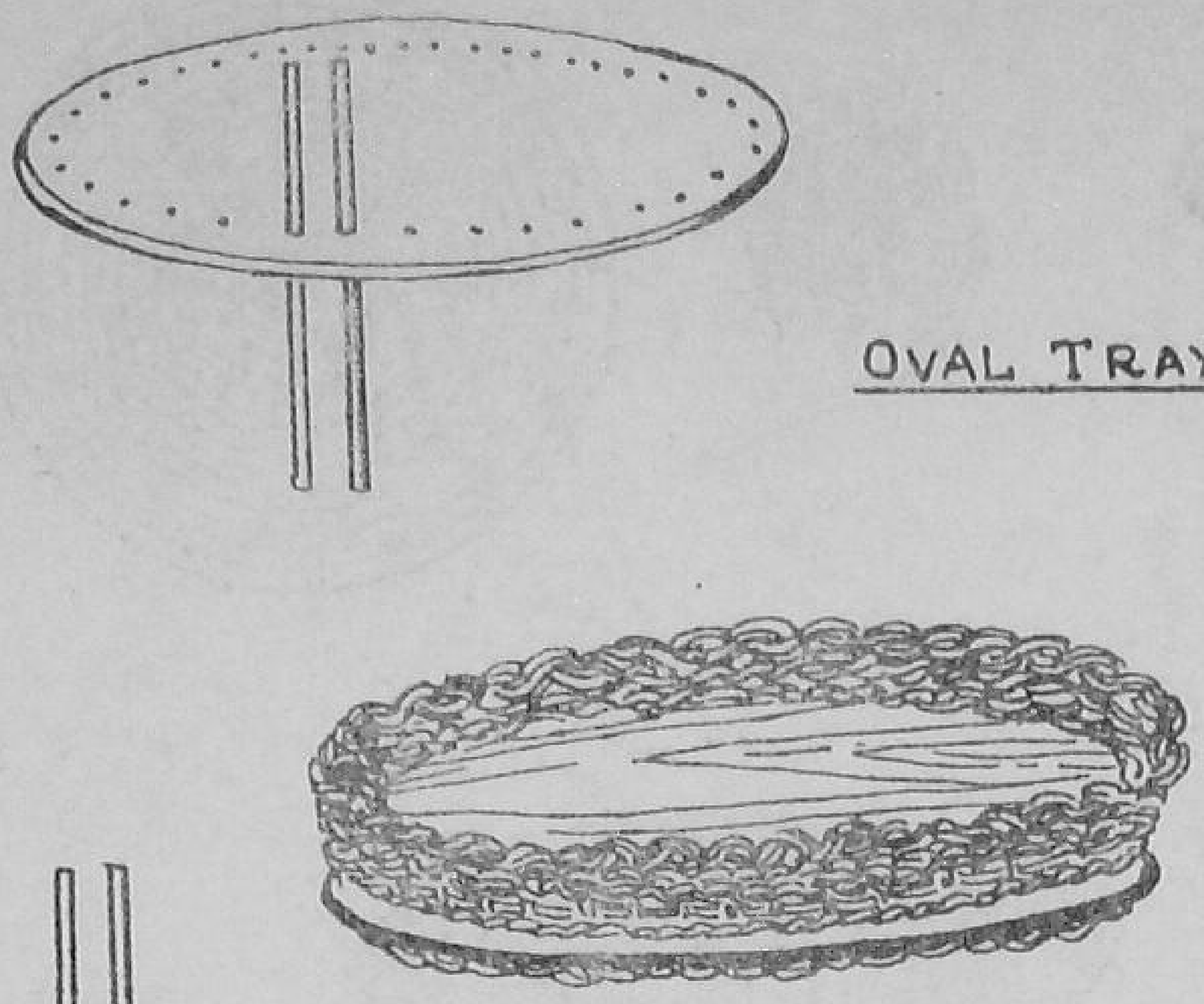


BAMBOO FAN.

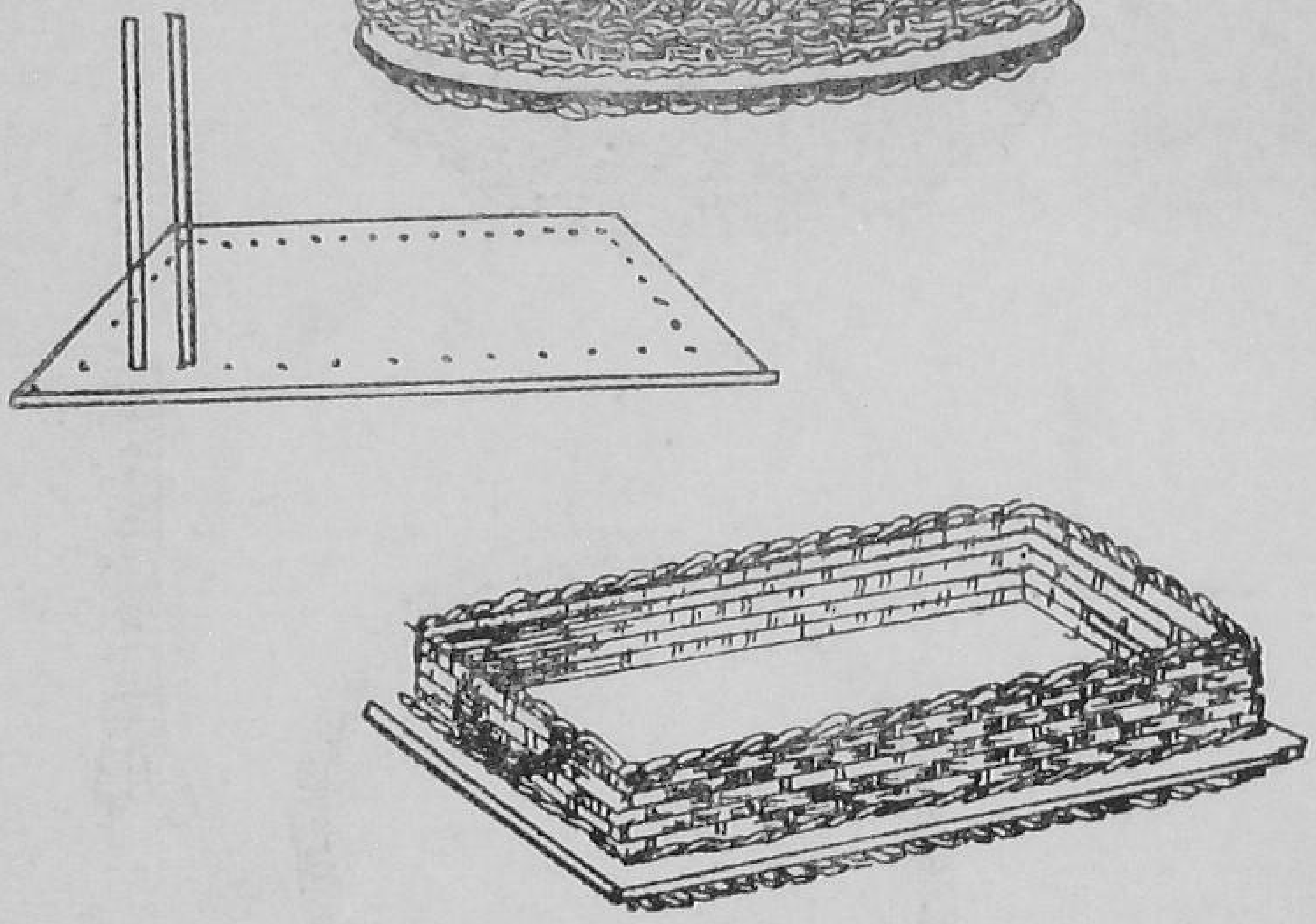

WASTE PAPER BASKET. No. 2.



ROUND FLOWER BASKET.

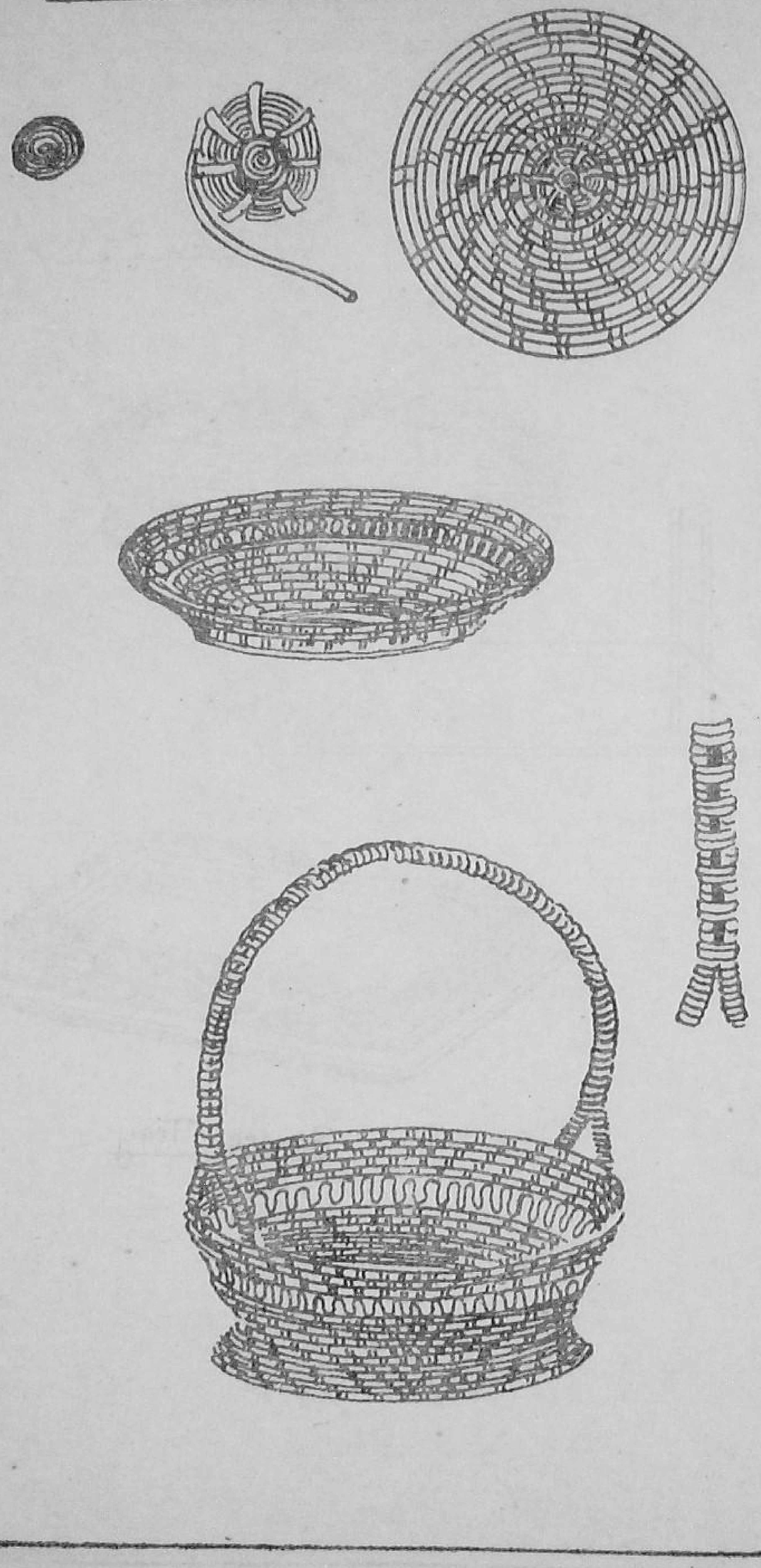


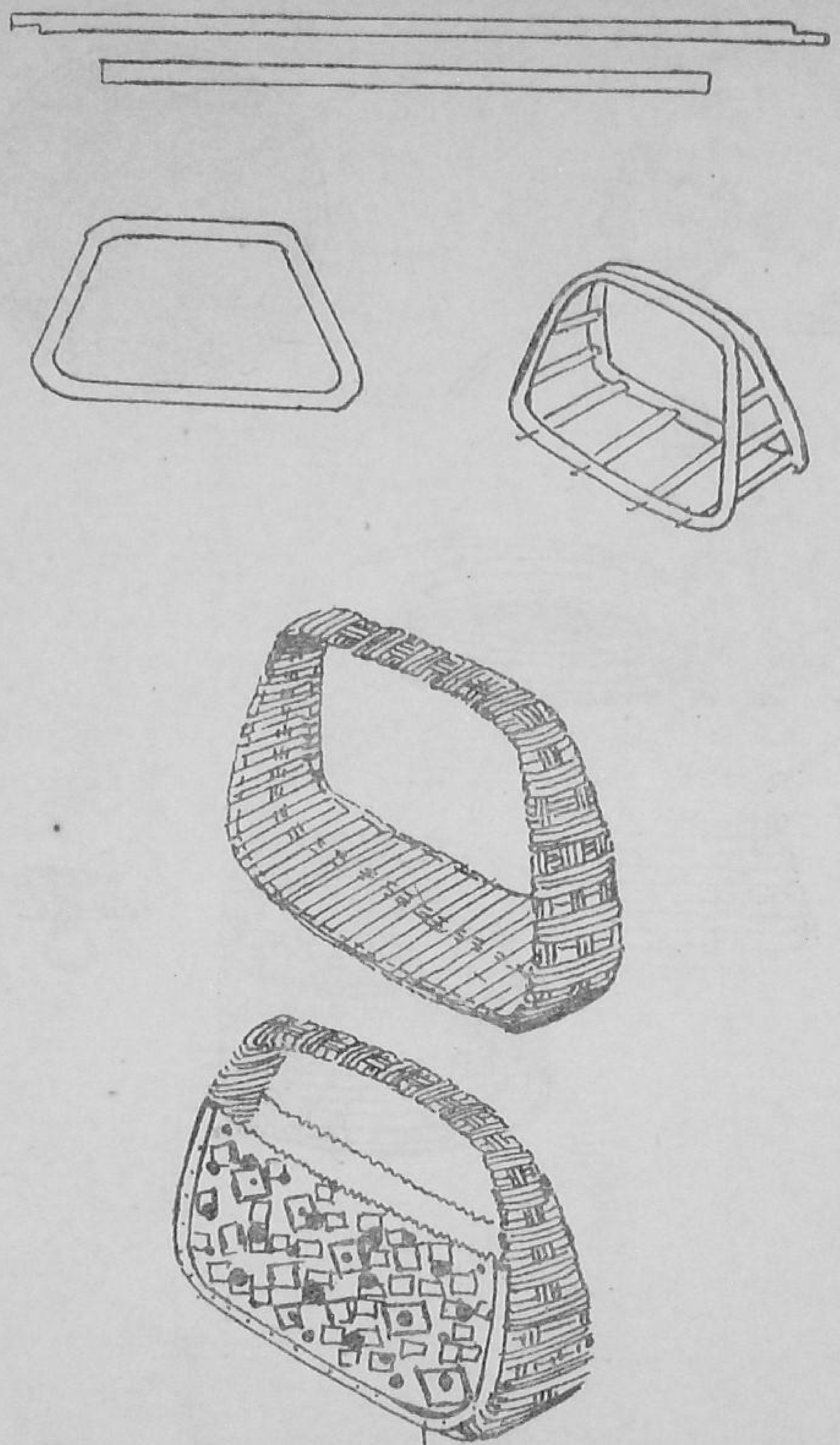
OVAL TRAY.



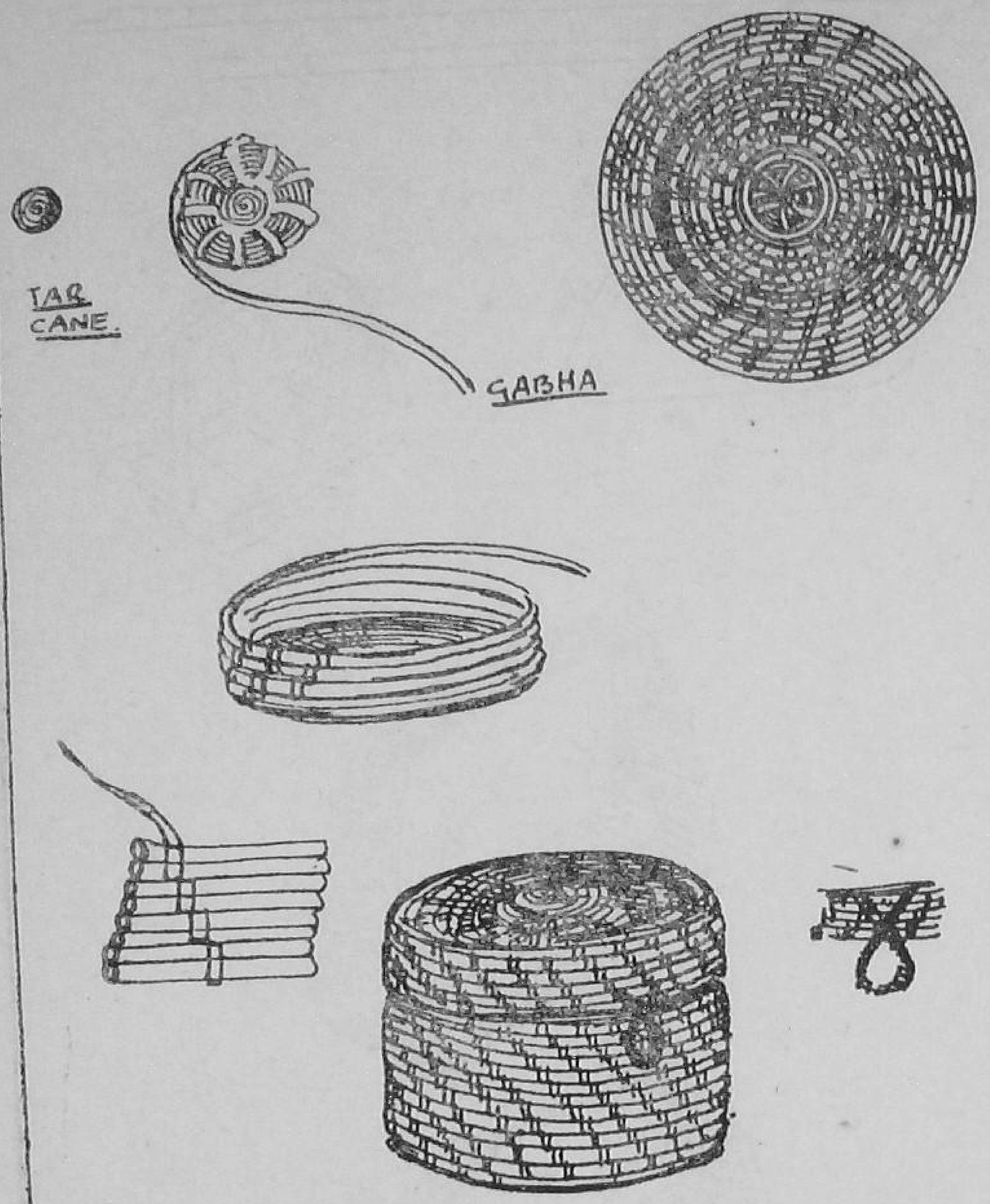
Square Tray

FLOWER BASKET (CANE)



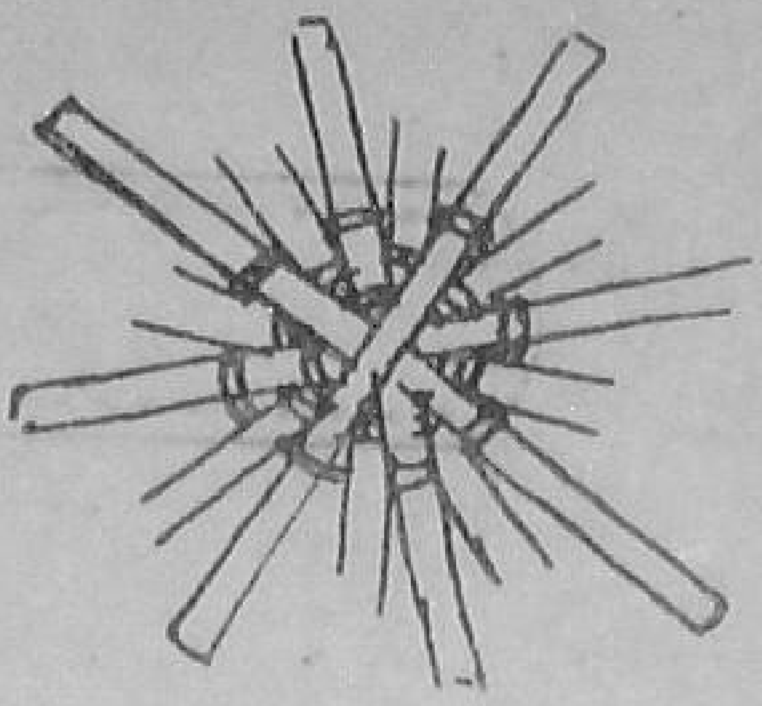


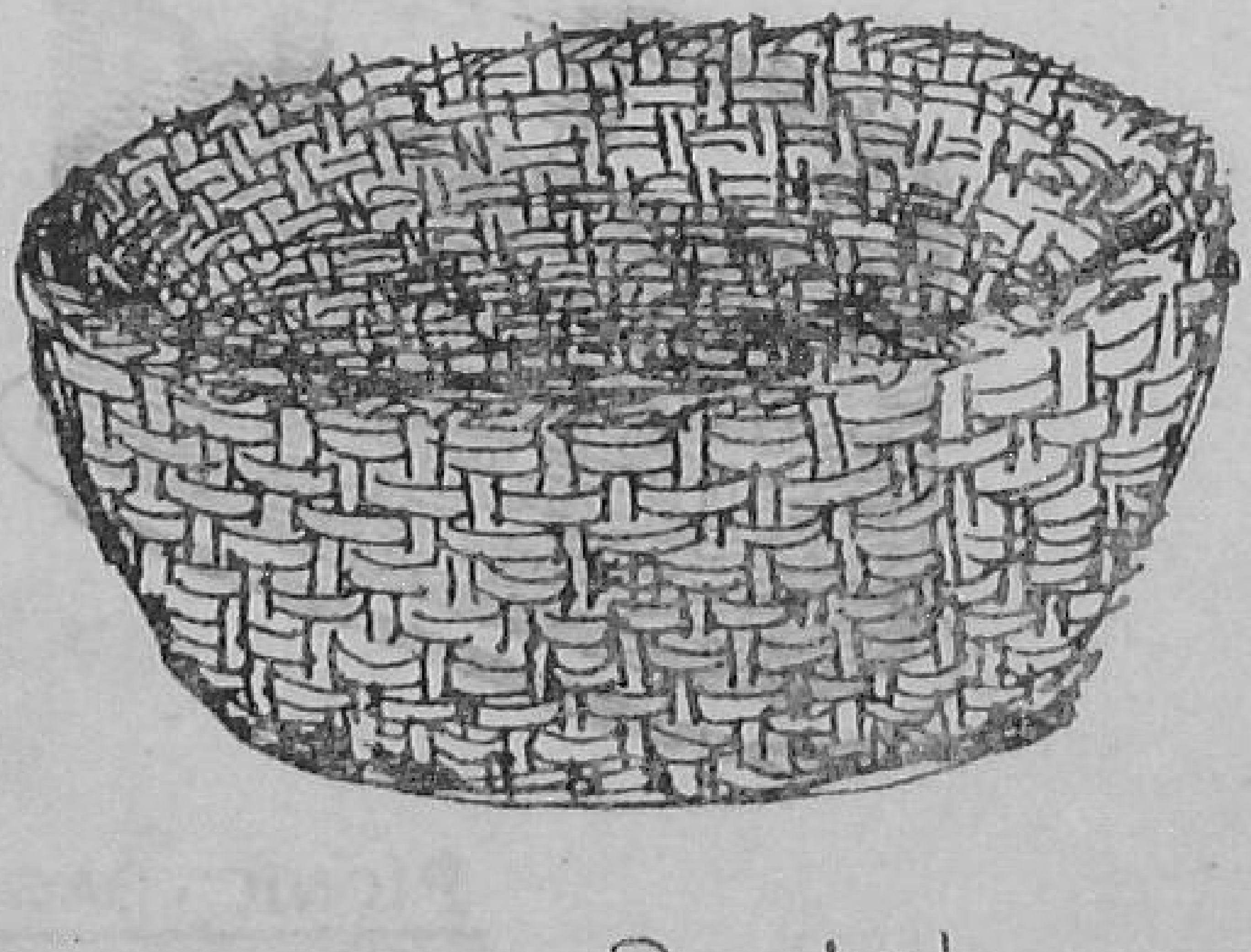
MARKET BAG.



ROUND BOX. (CANE)

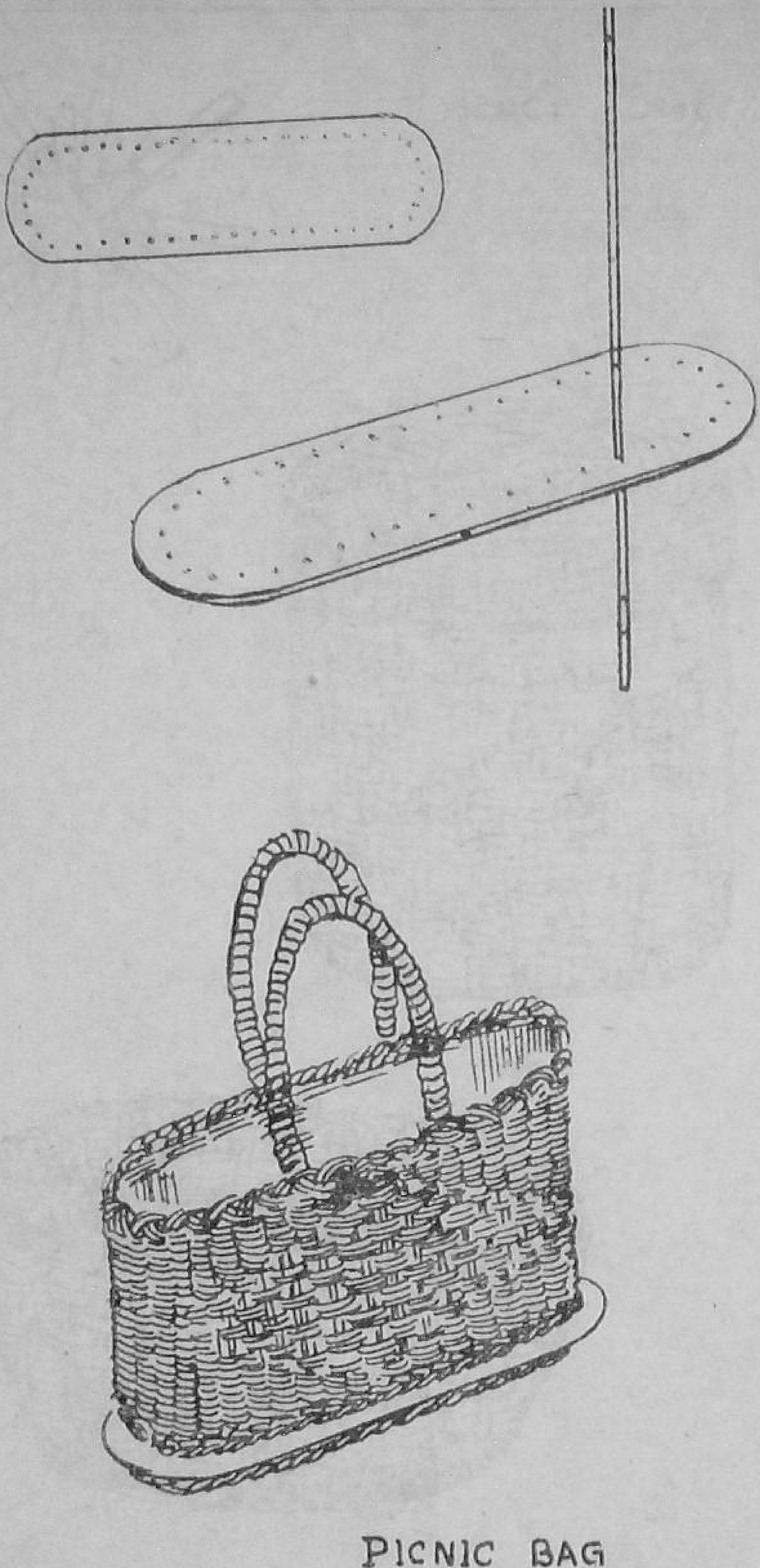
— MANGO Basket —



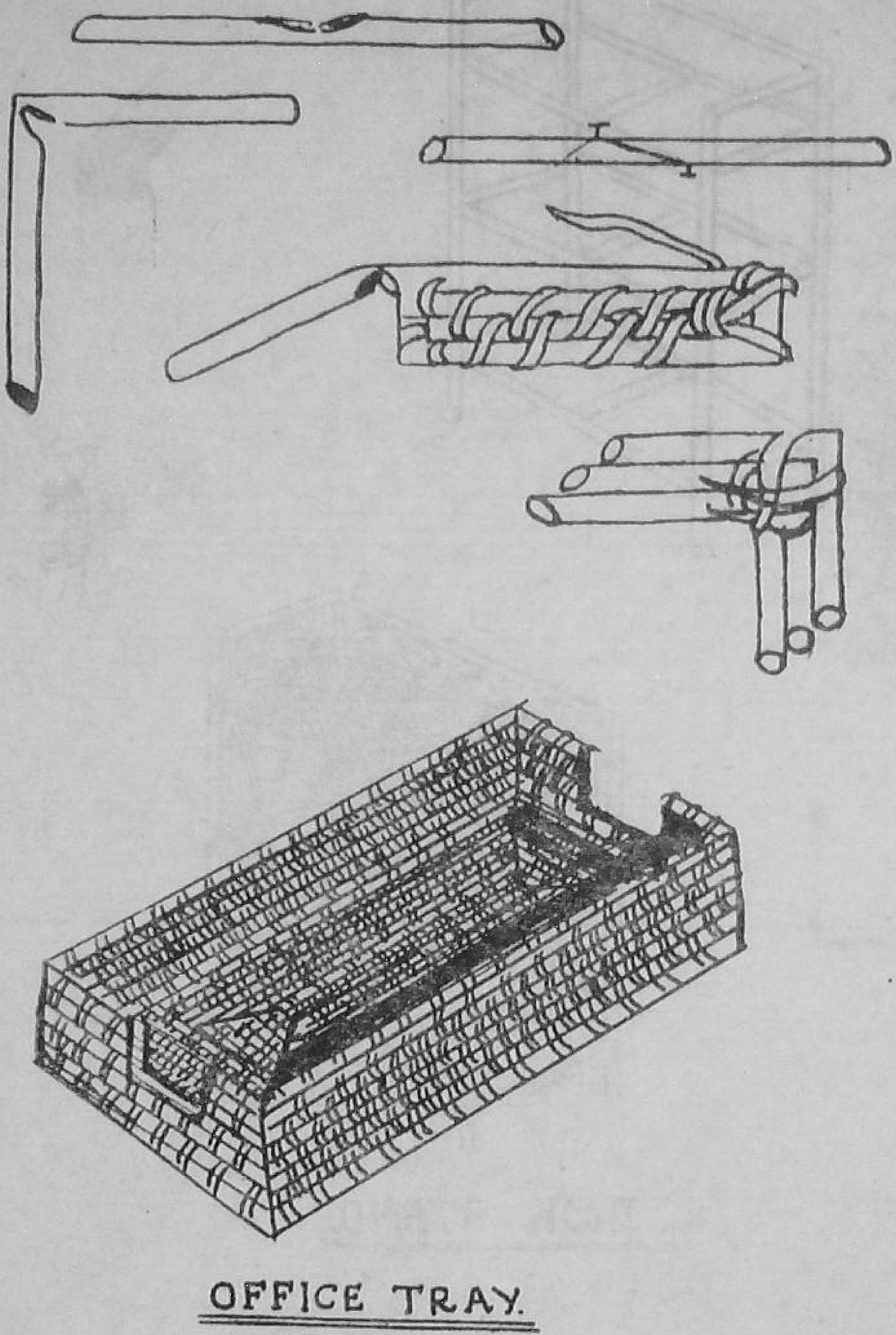


Basket —

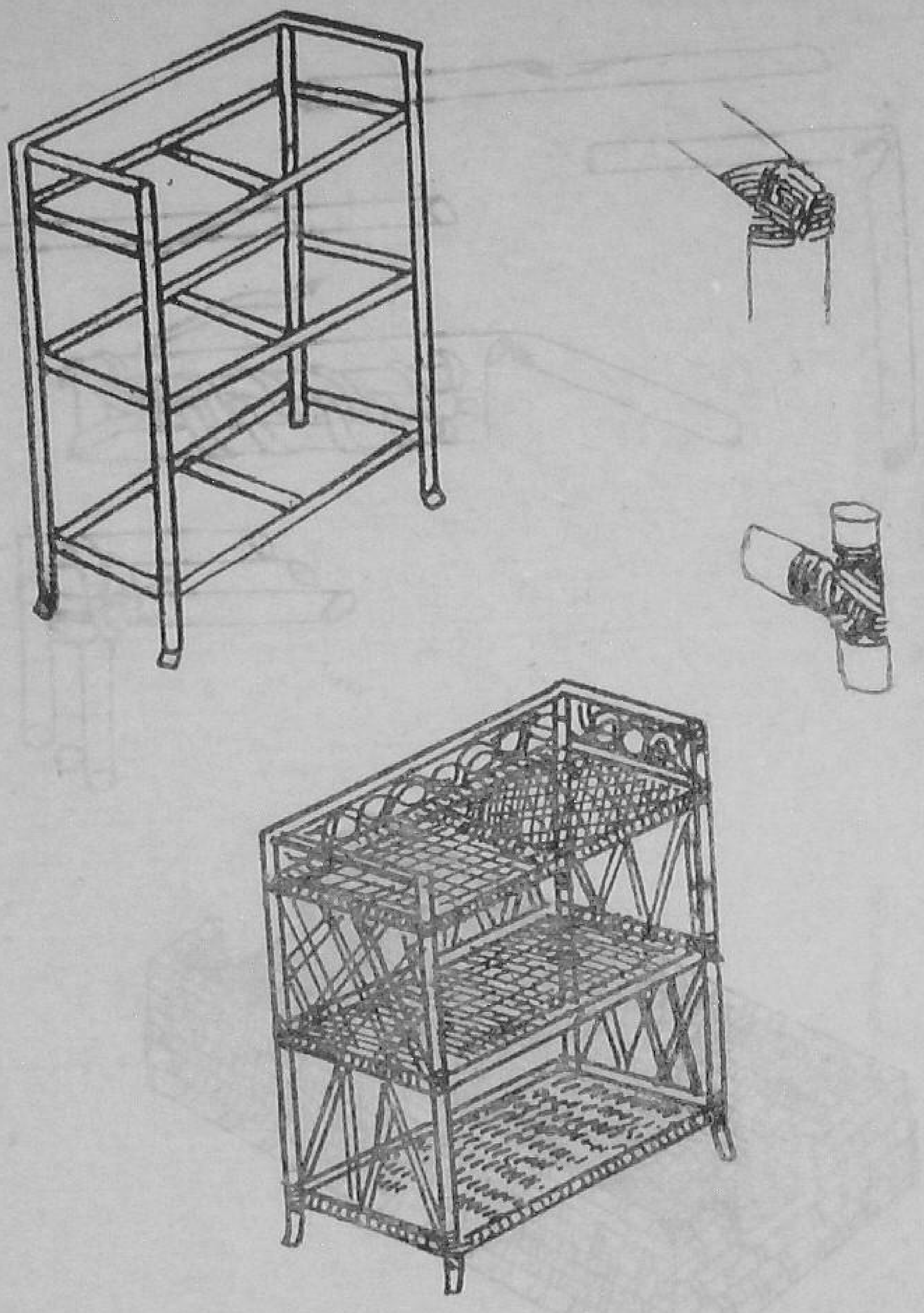
L9C.D.&C/62—8



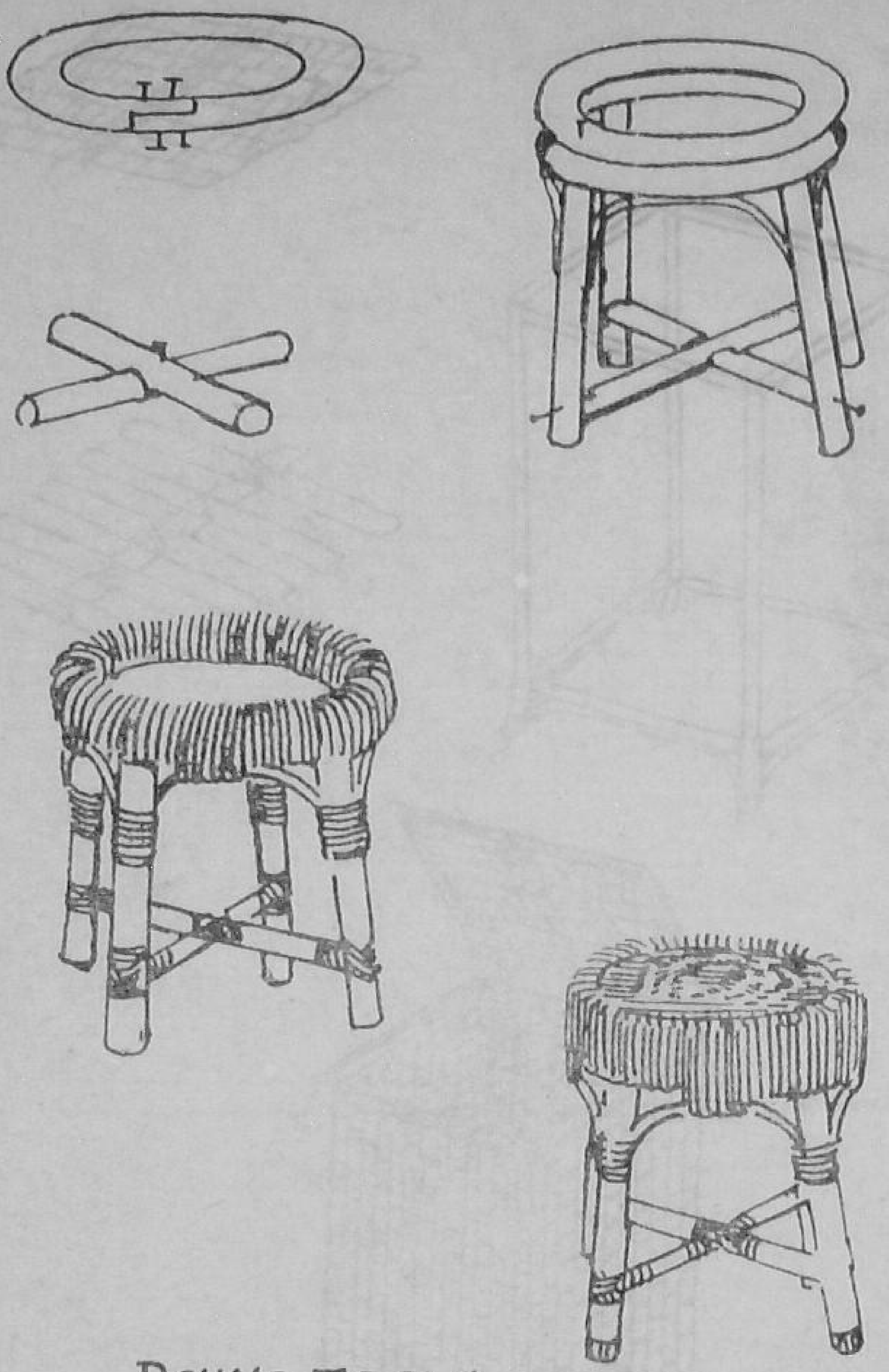
PICNIC BAG



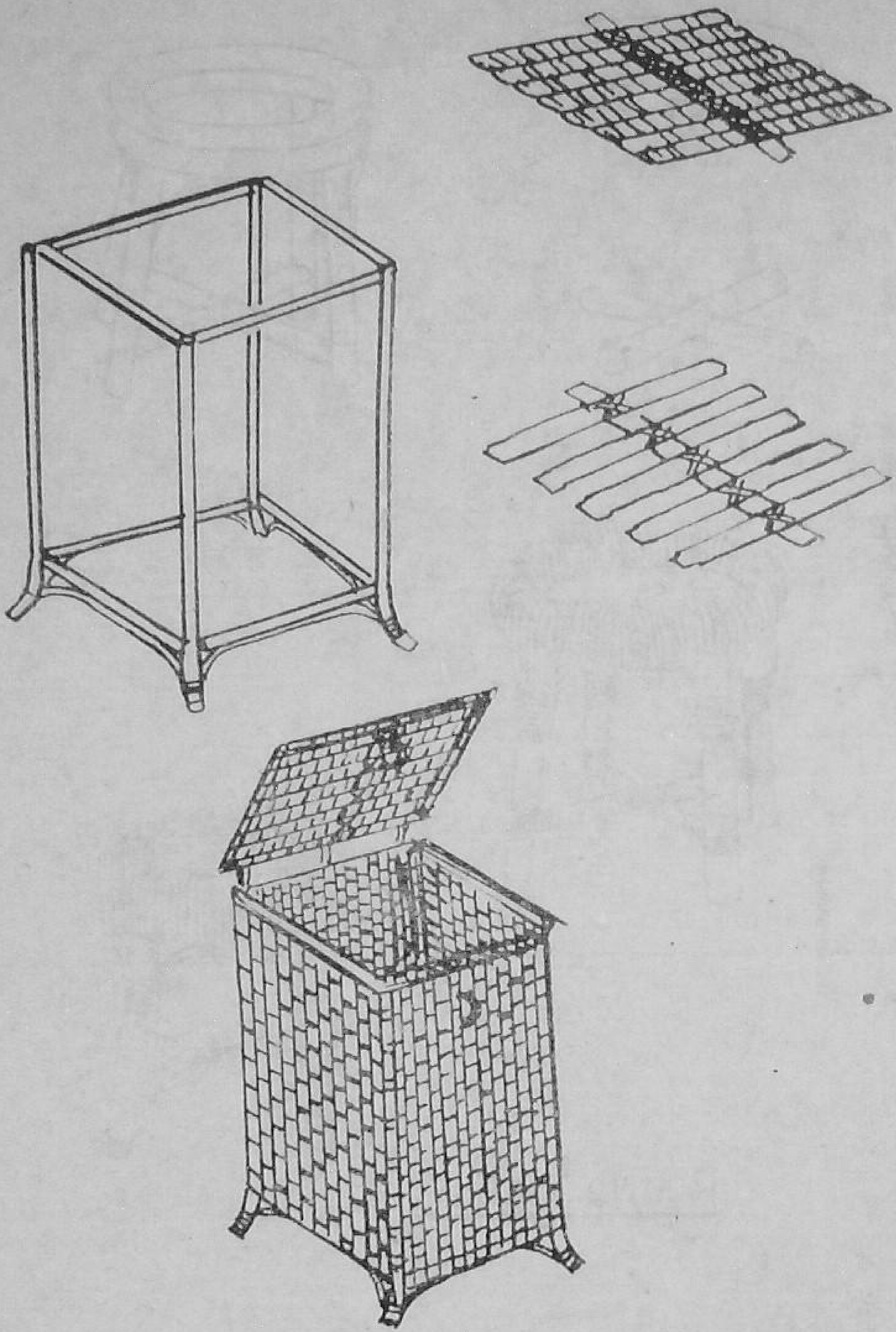
OFFICE TRAY.



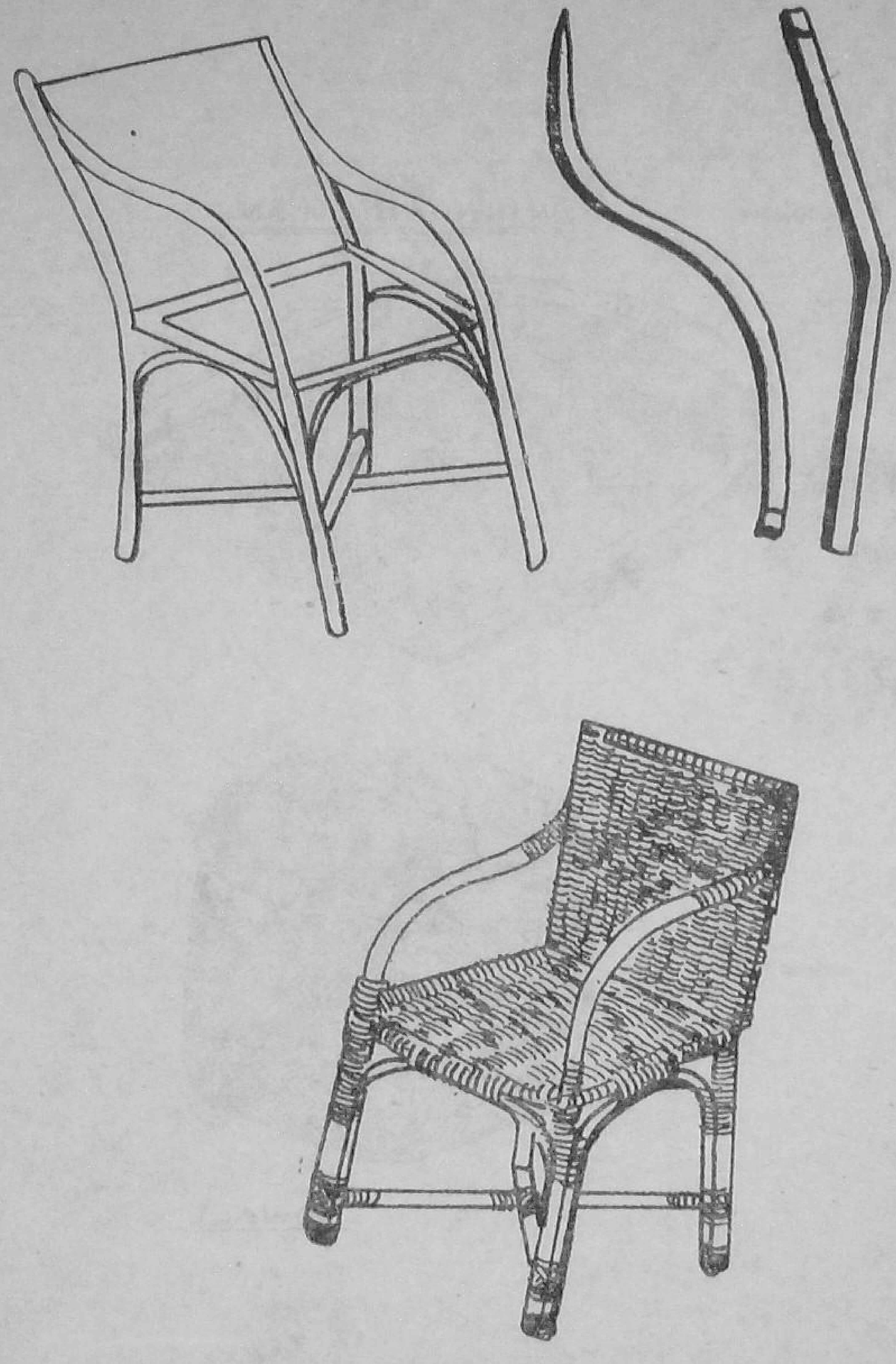
BOOK STAND.



ROUND TABLE.

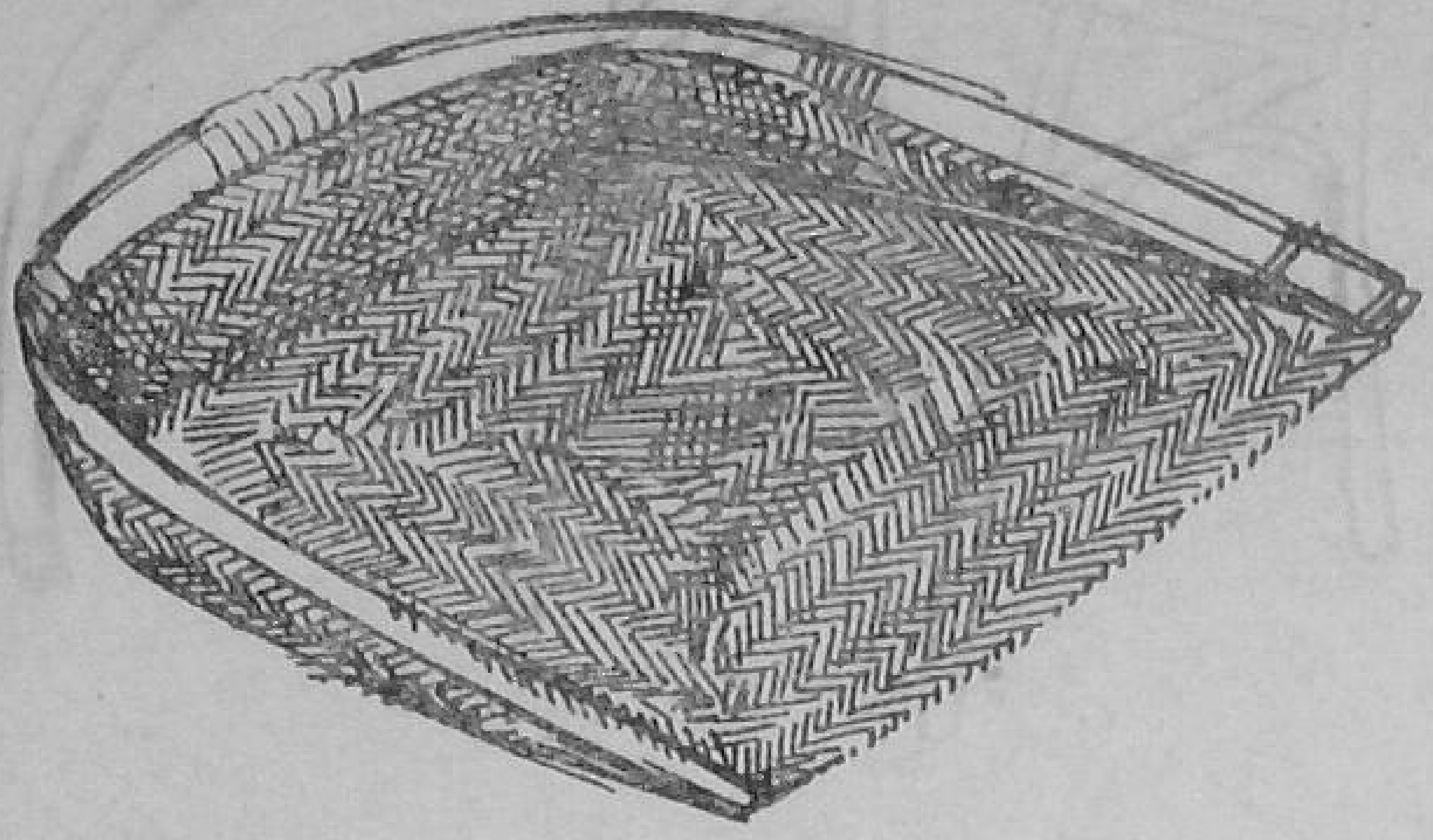


LAUNDRY BASKET

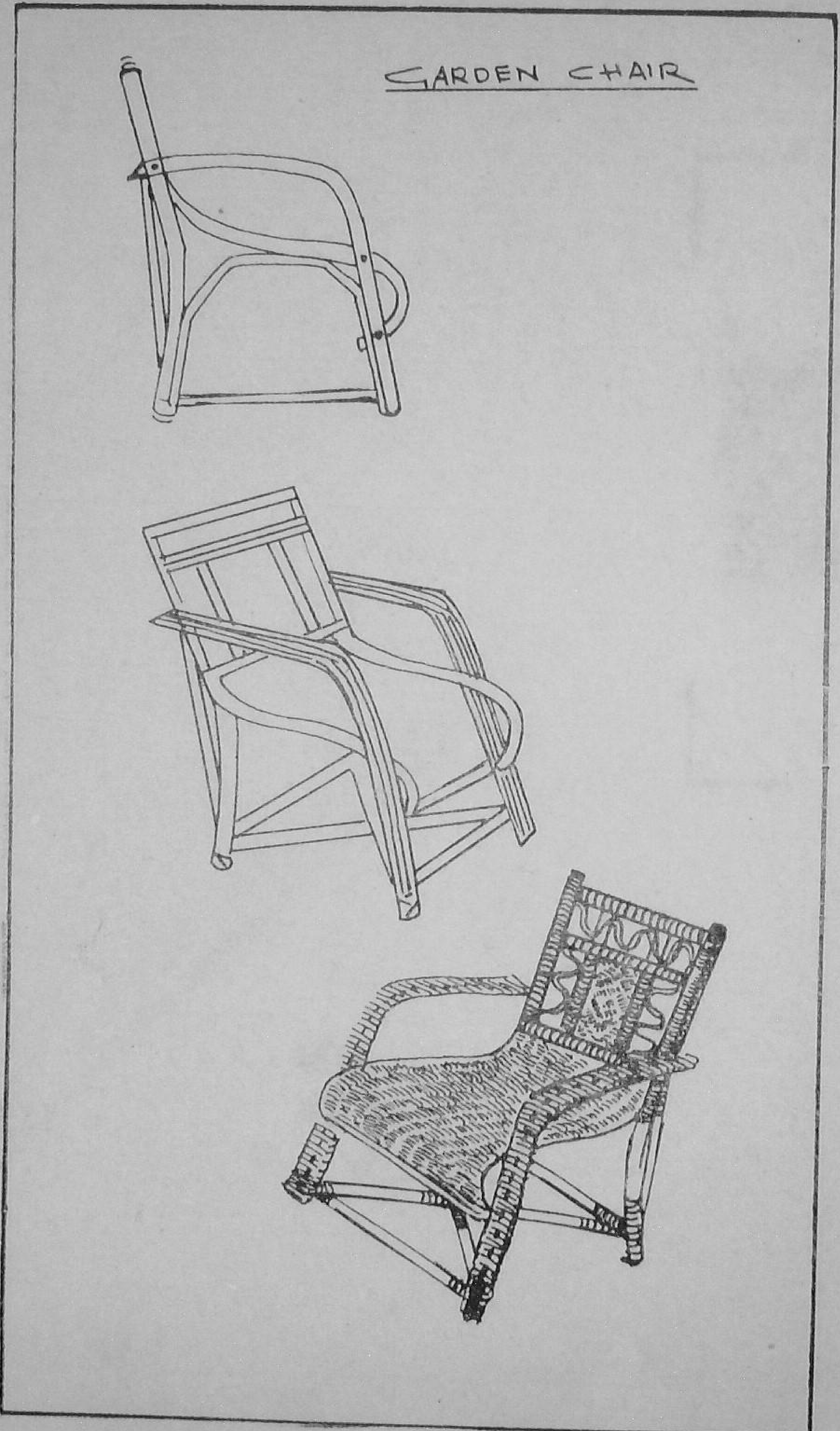


BABY - CHAIR

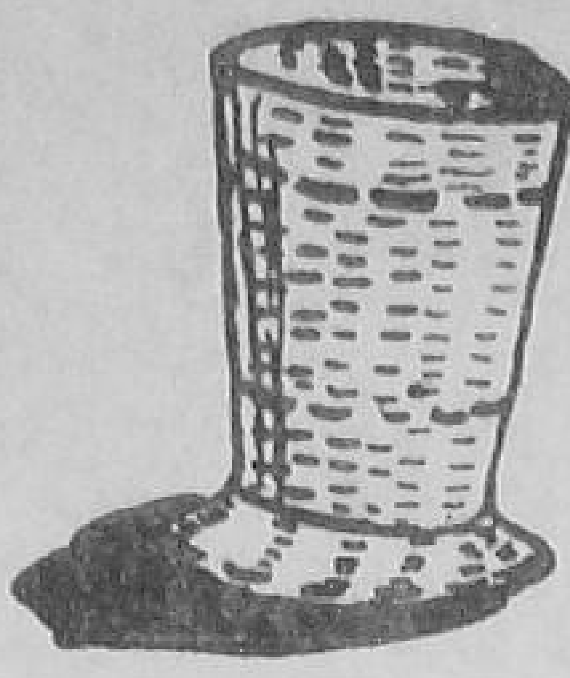
WINNOWING FAN.



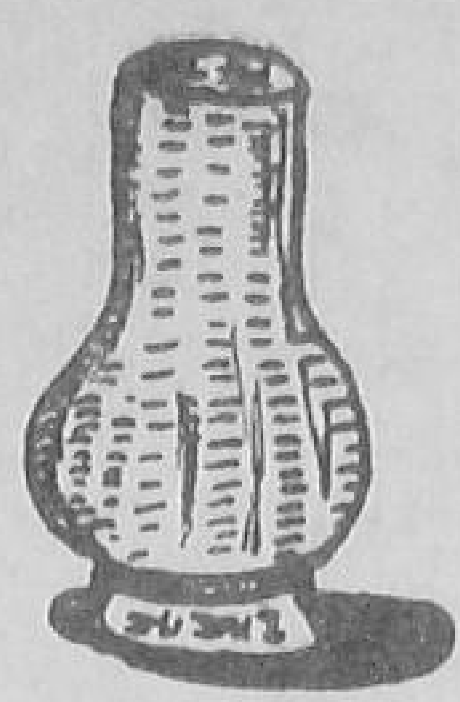
ROWALI


GARDEN CHAIR

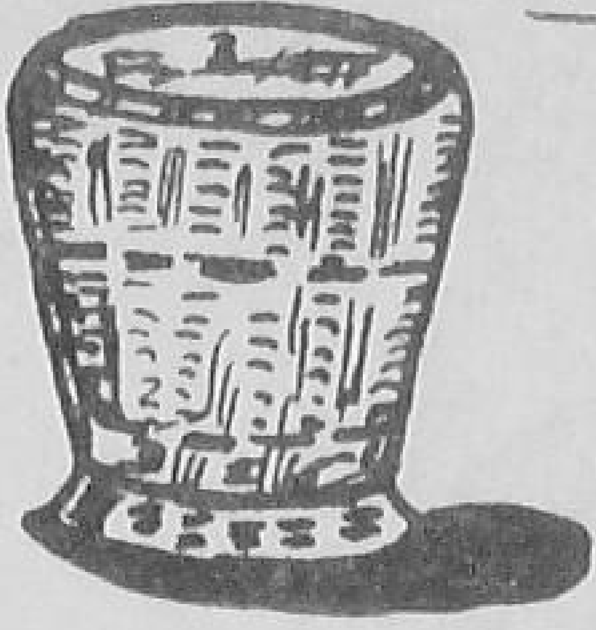
BAMBOO ARTICLES



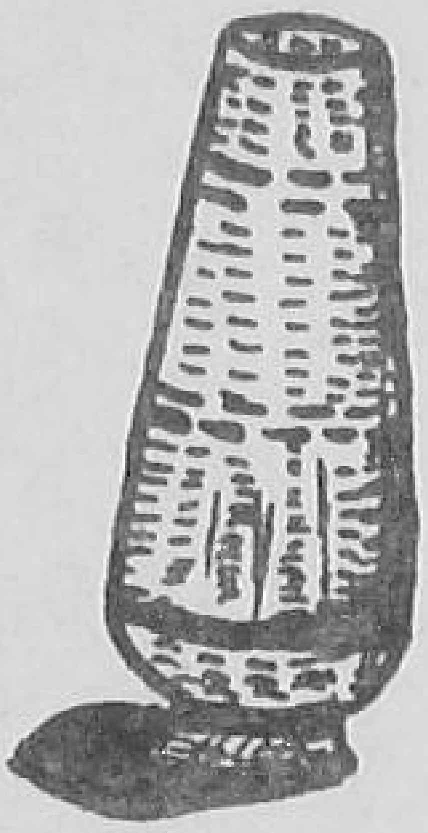
FLOWER-POT



FLOWER POT

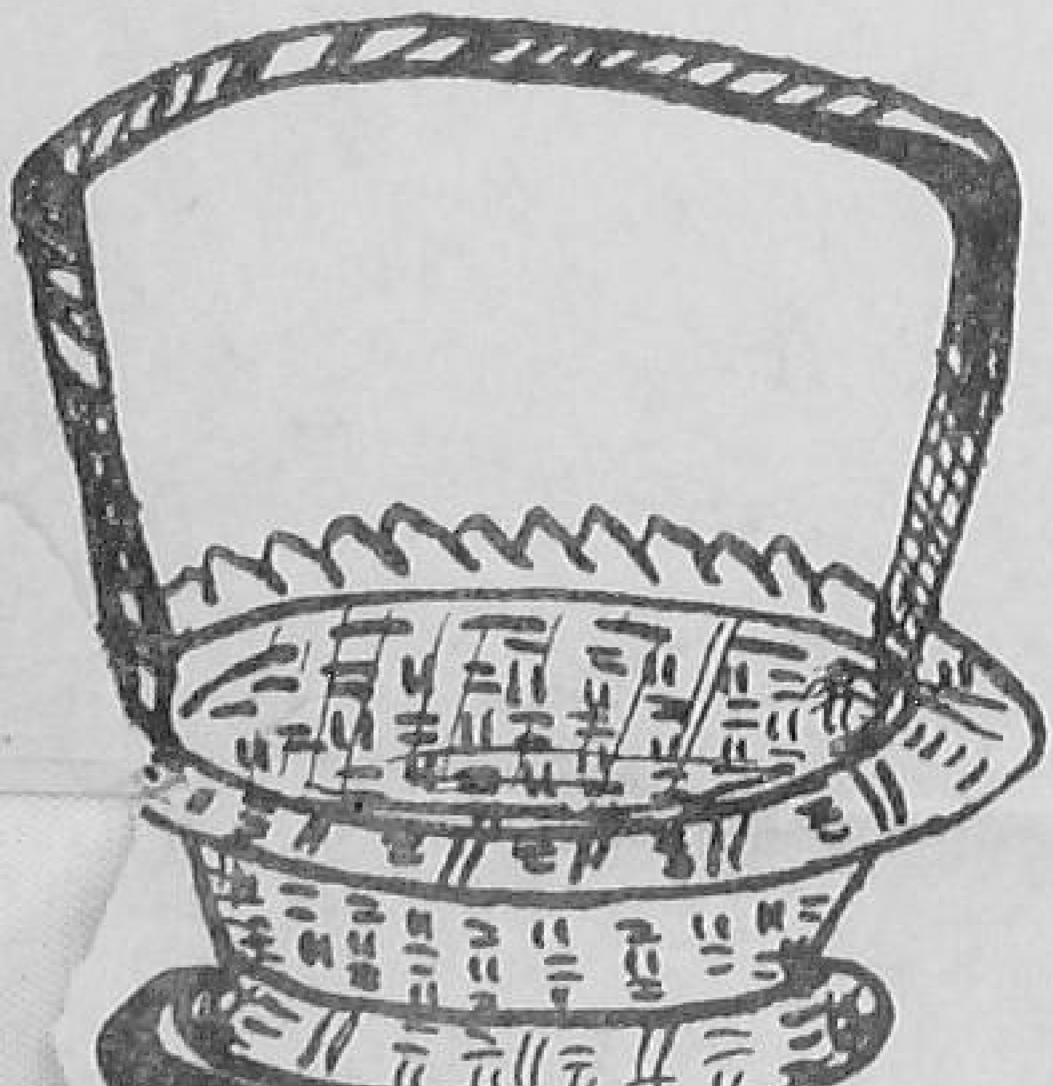


FLOWER POT

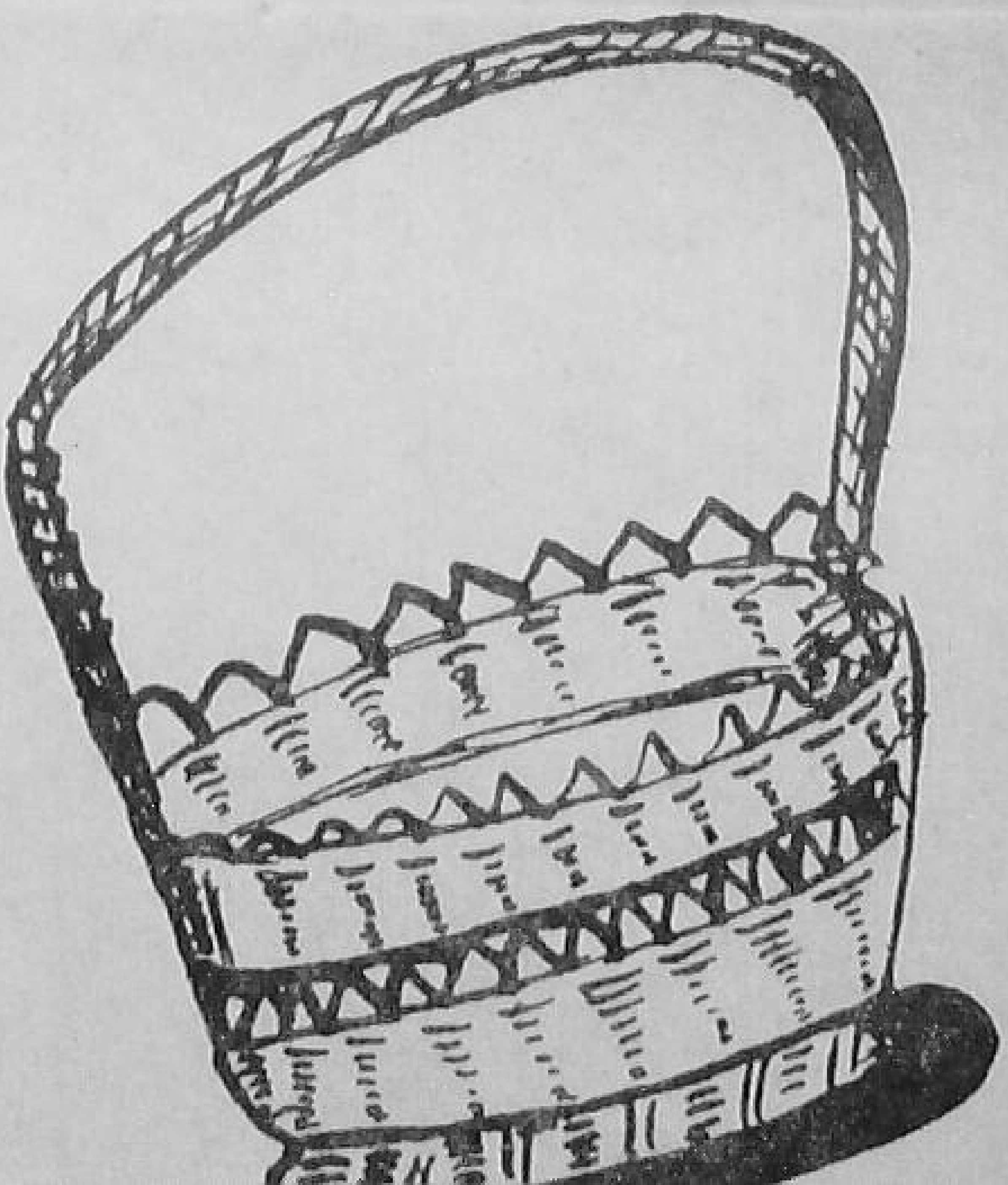


FLOWER POT

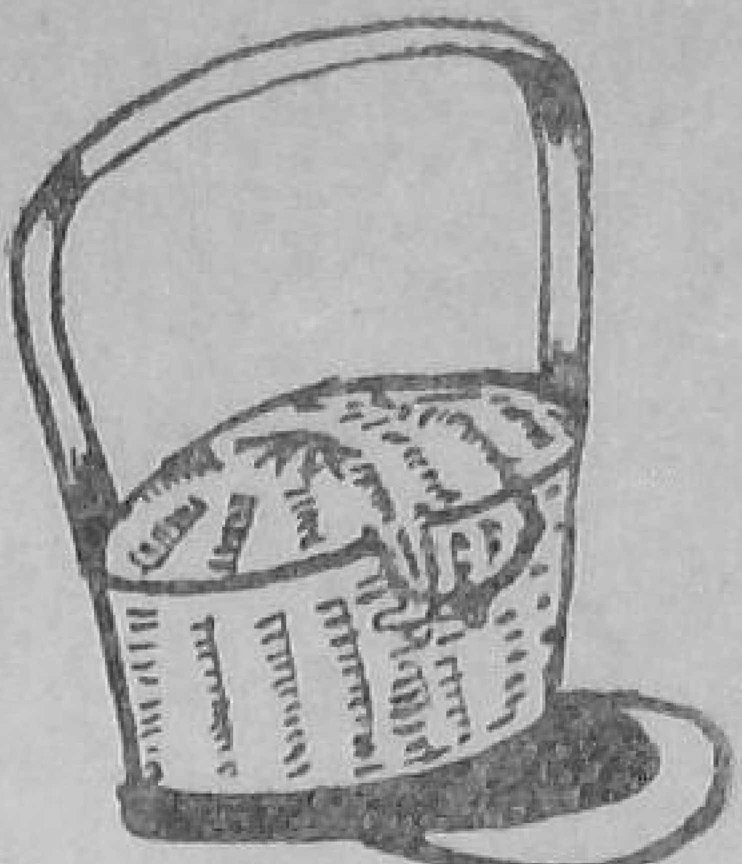
FLOWER POT



FLOWER BASKET



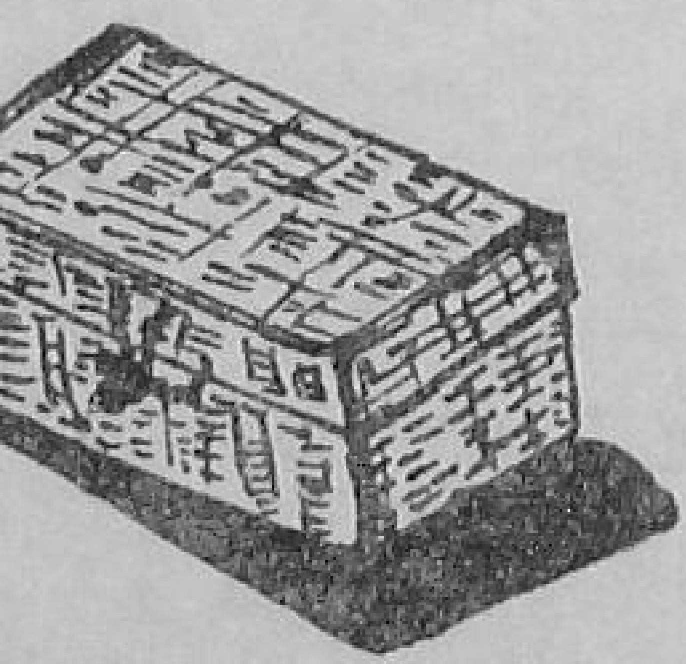
PURSE (BATWA)



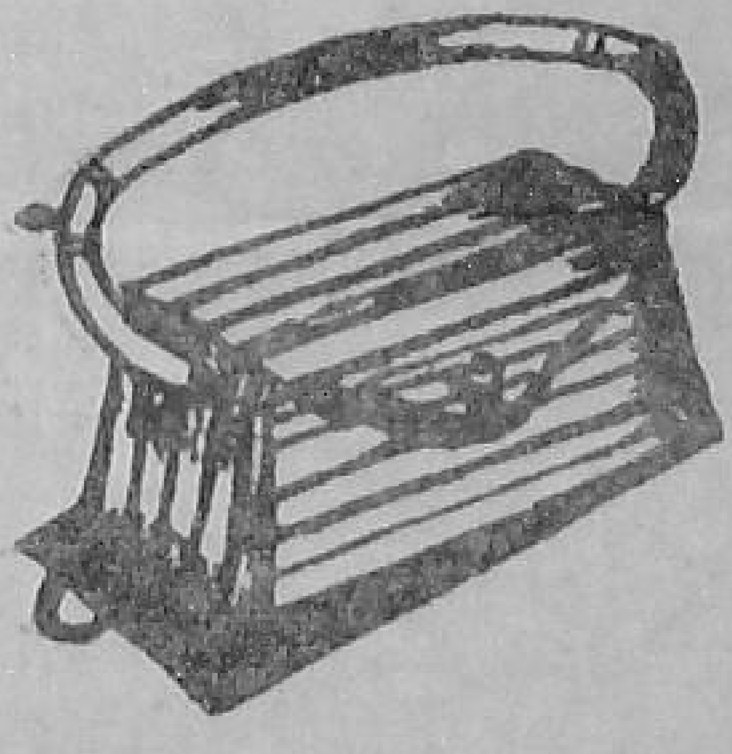
PURSE

PURSE

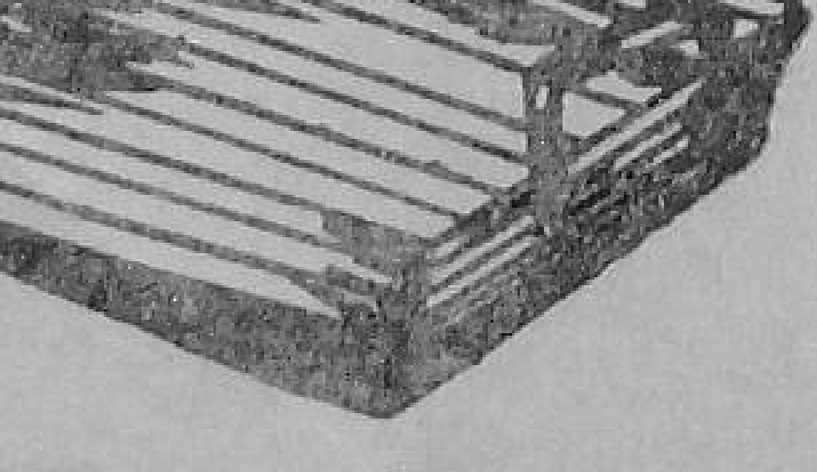
PURSE



MEDICINE BOX

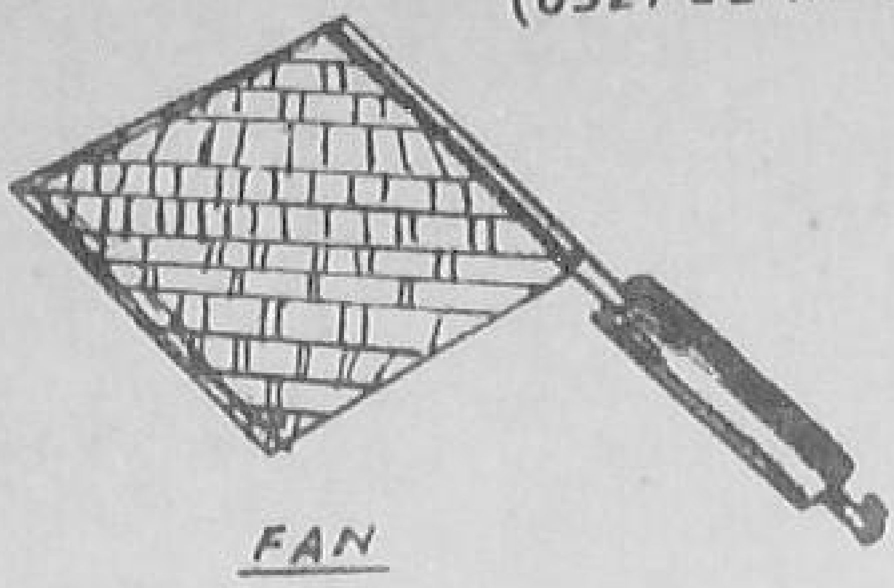


STRIP-BAG

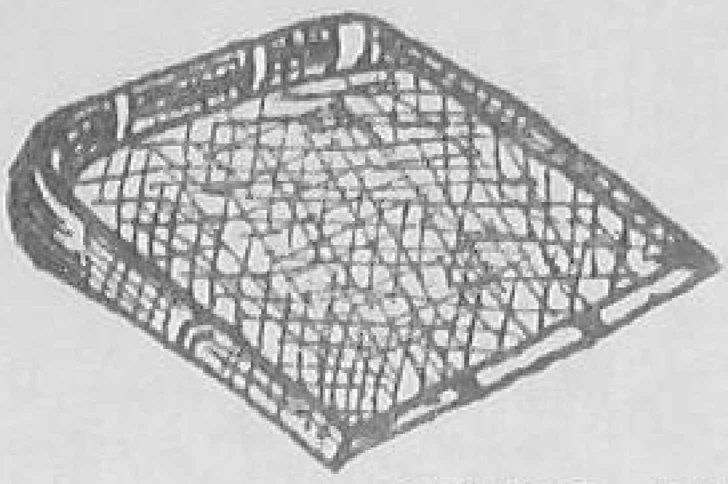


STRIP TRAY

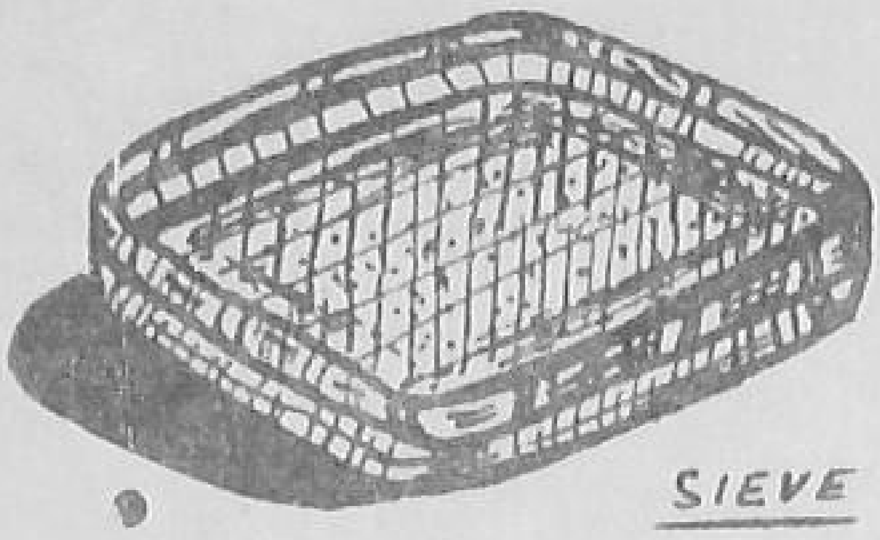
BAMBOO ARTICLES
(USEFUL IN VILLAGE)



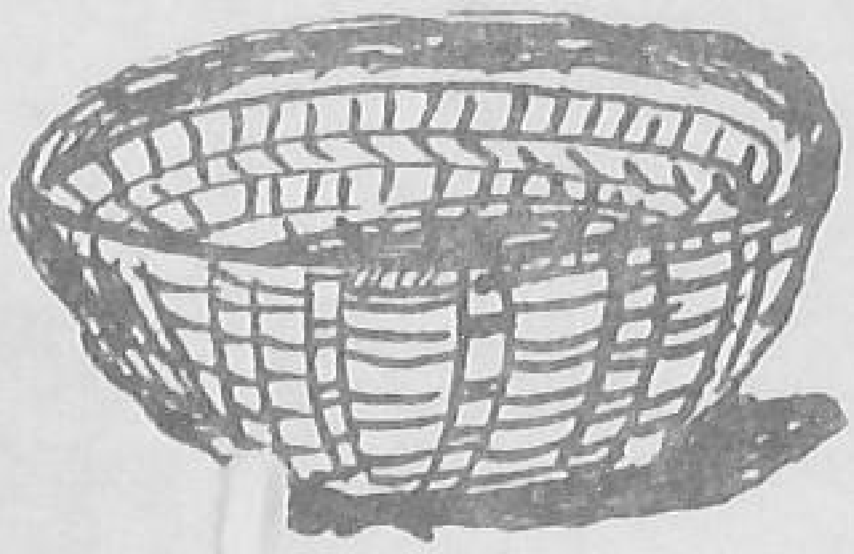
FAN



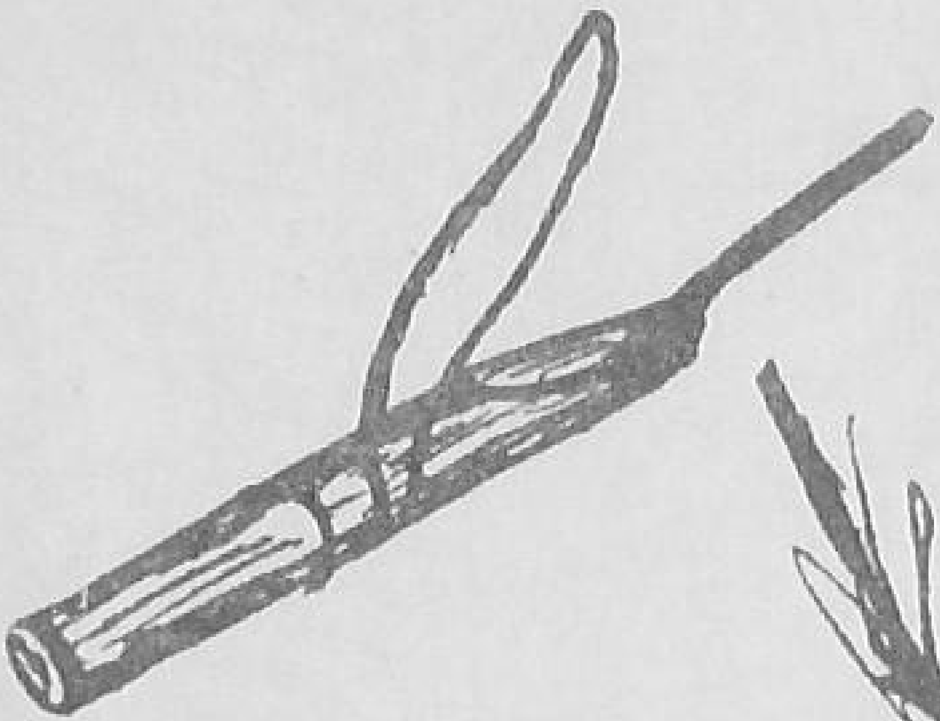
WINNOWING - FAN



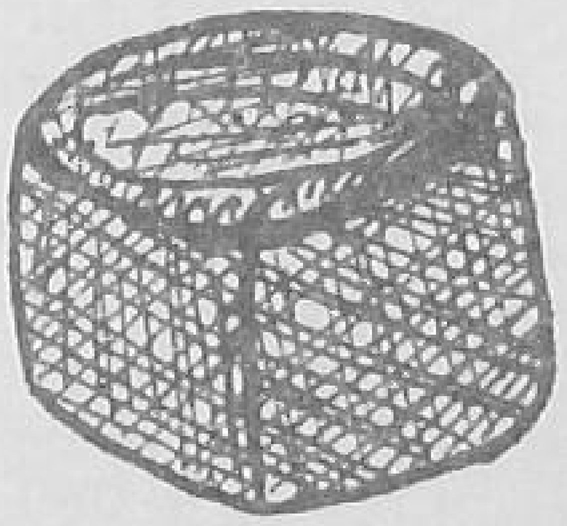
SIEVE



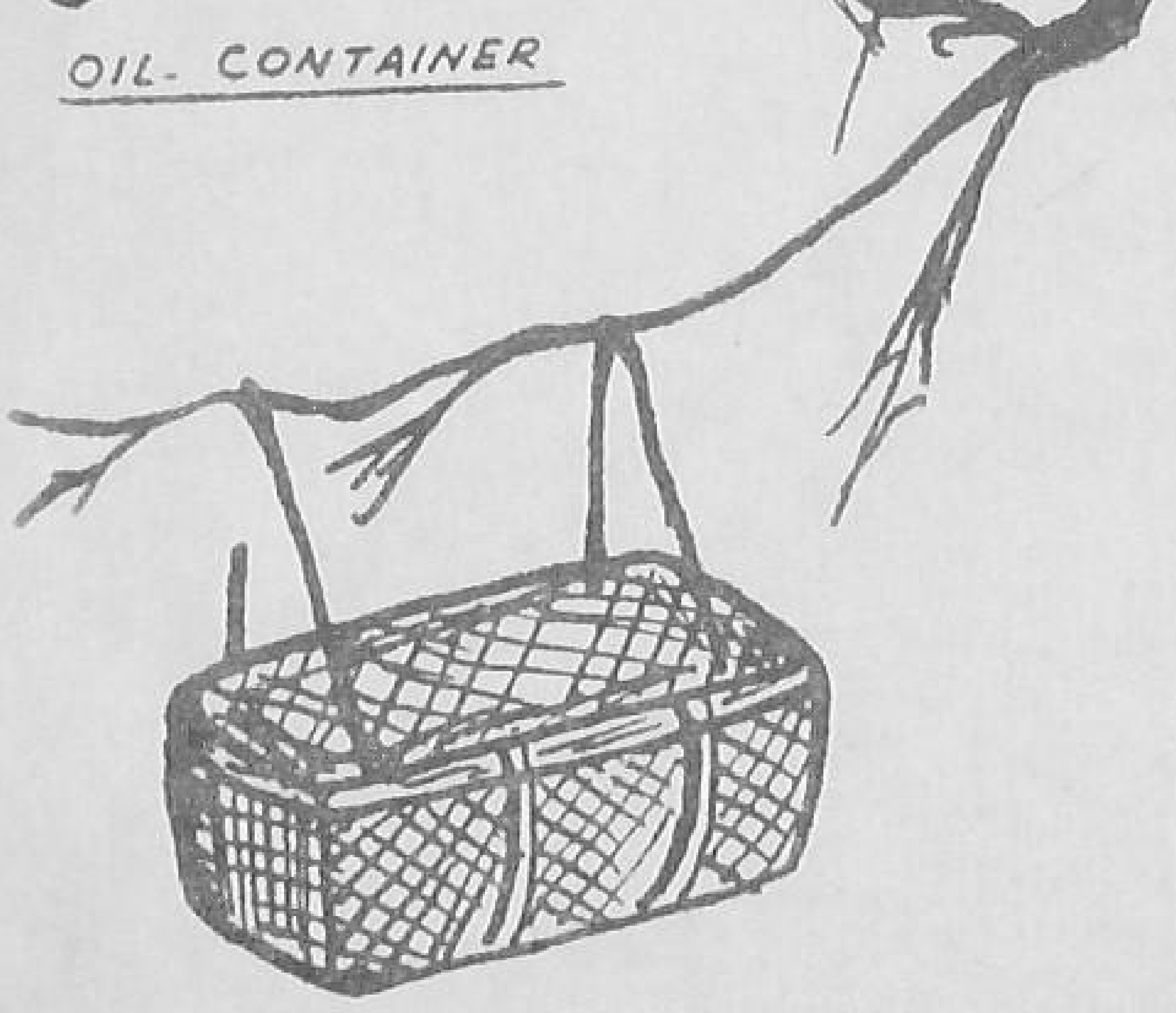
BASKET



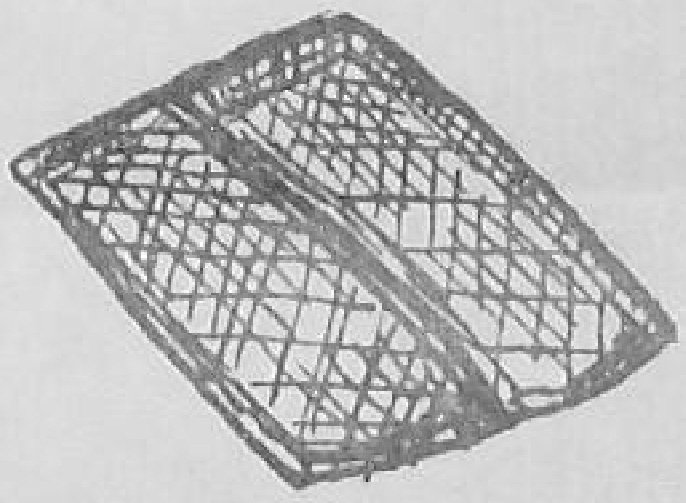
OIL- CONTAINER



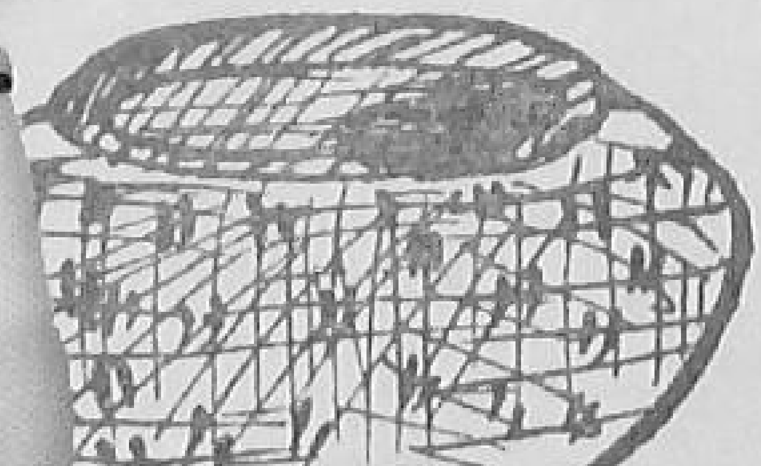
RICE CLEANING BASKET



CRADLE



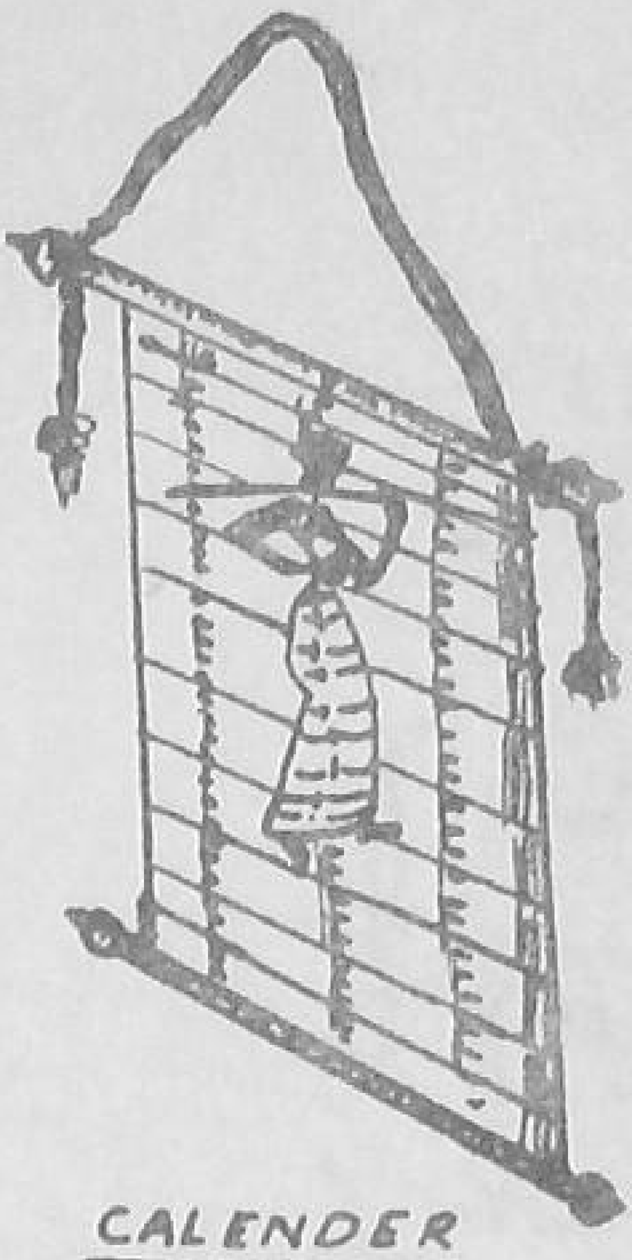
BETTLE-LEAVES CONTAINER



CORN - BASKET

BAMBOO ARTICLES

CALENDER-FRAME



CALENDER

CALENDER

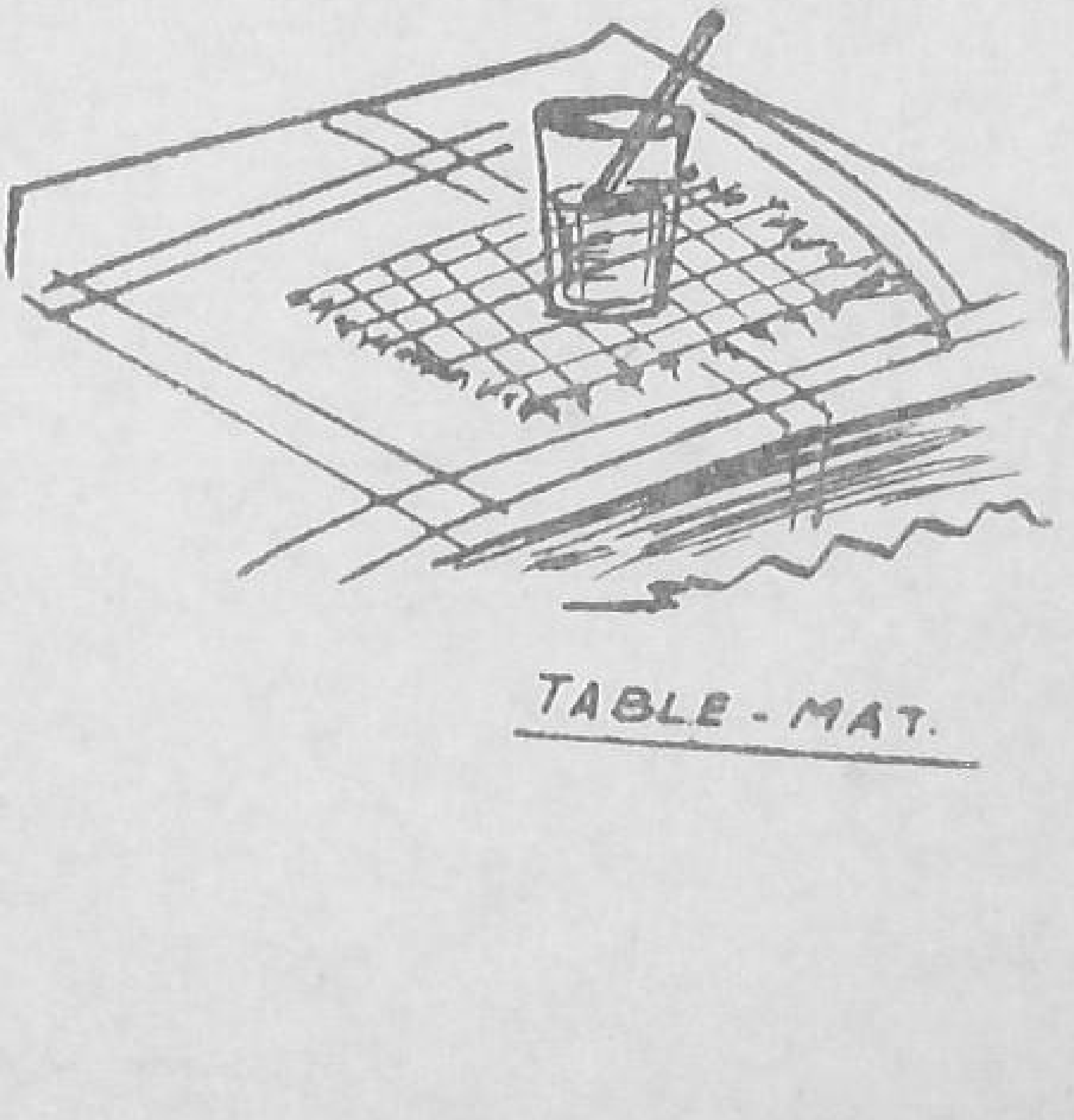
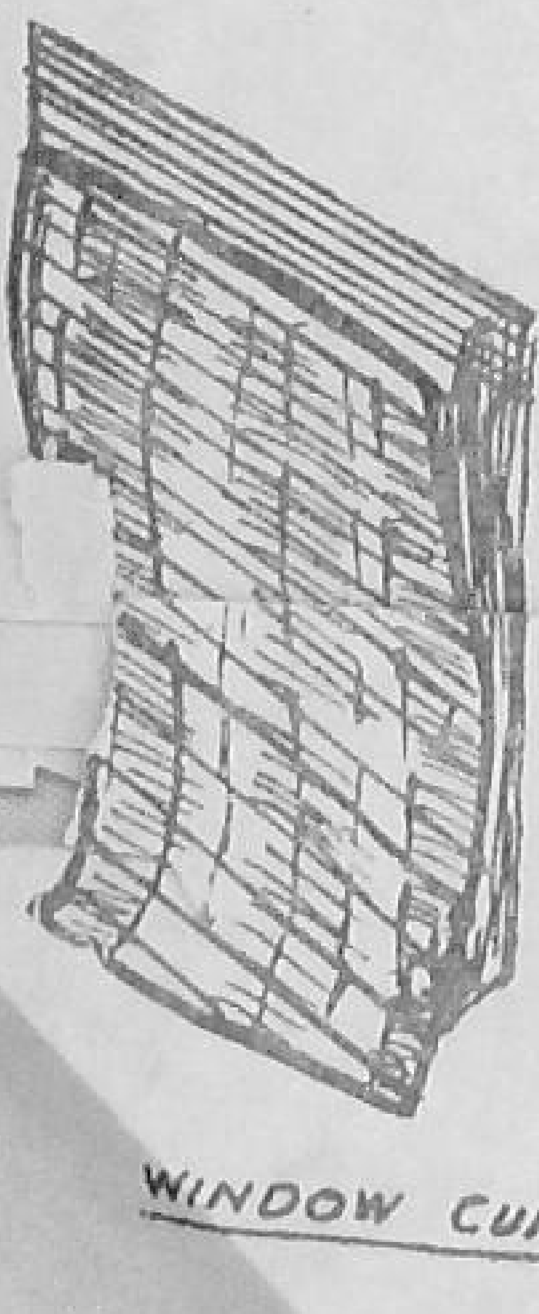
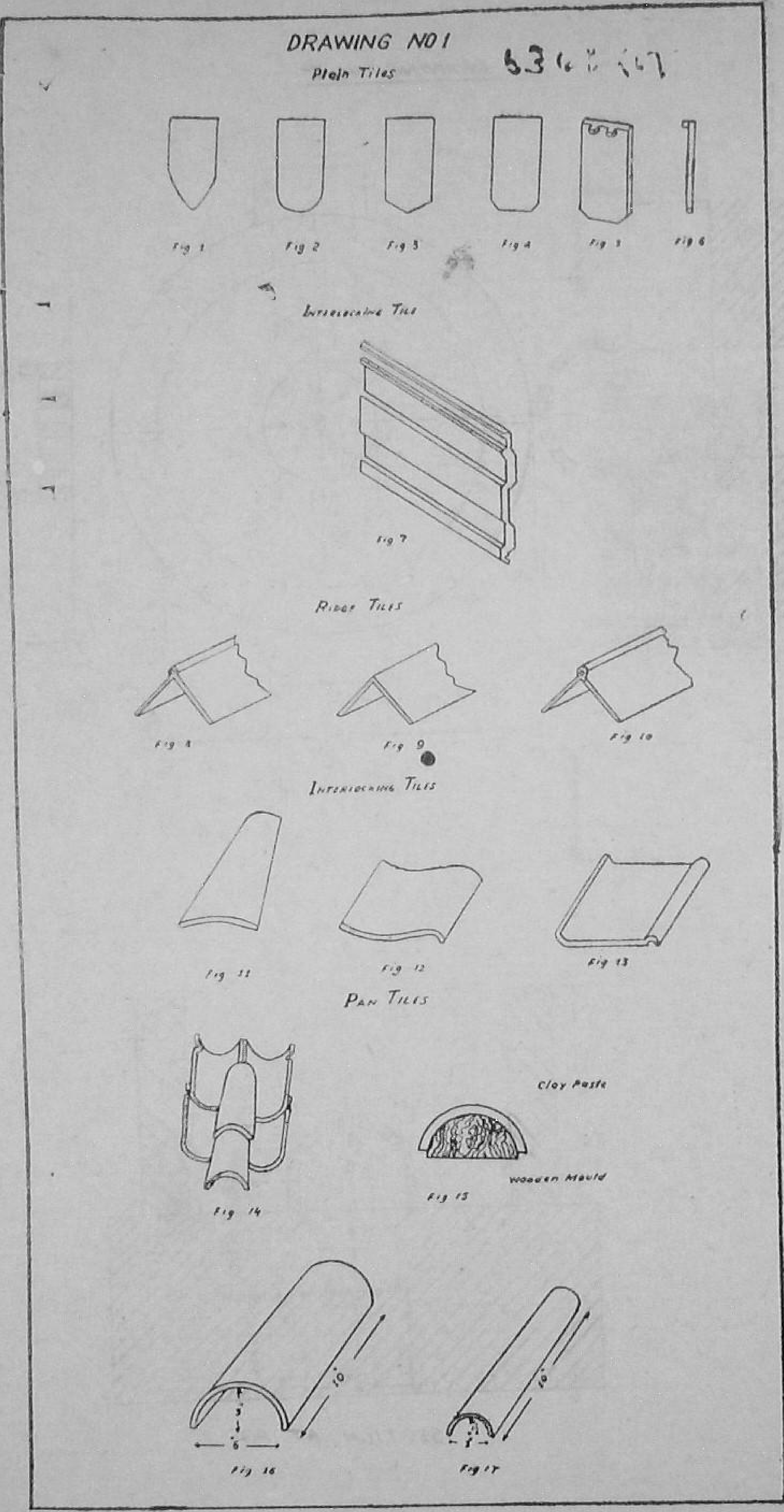


TABLE-MAT.

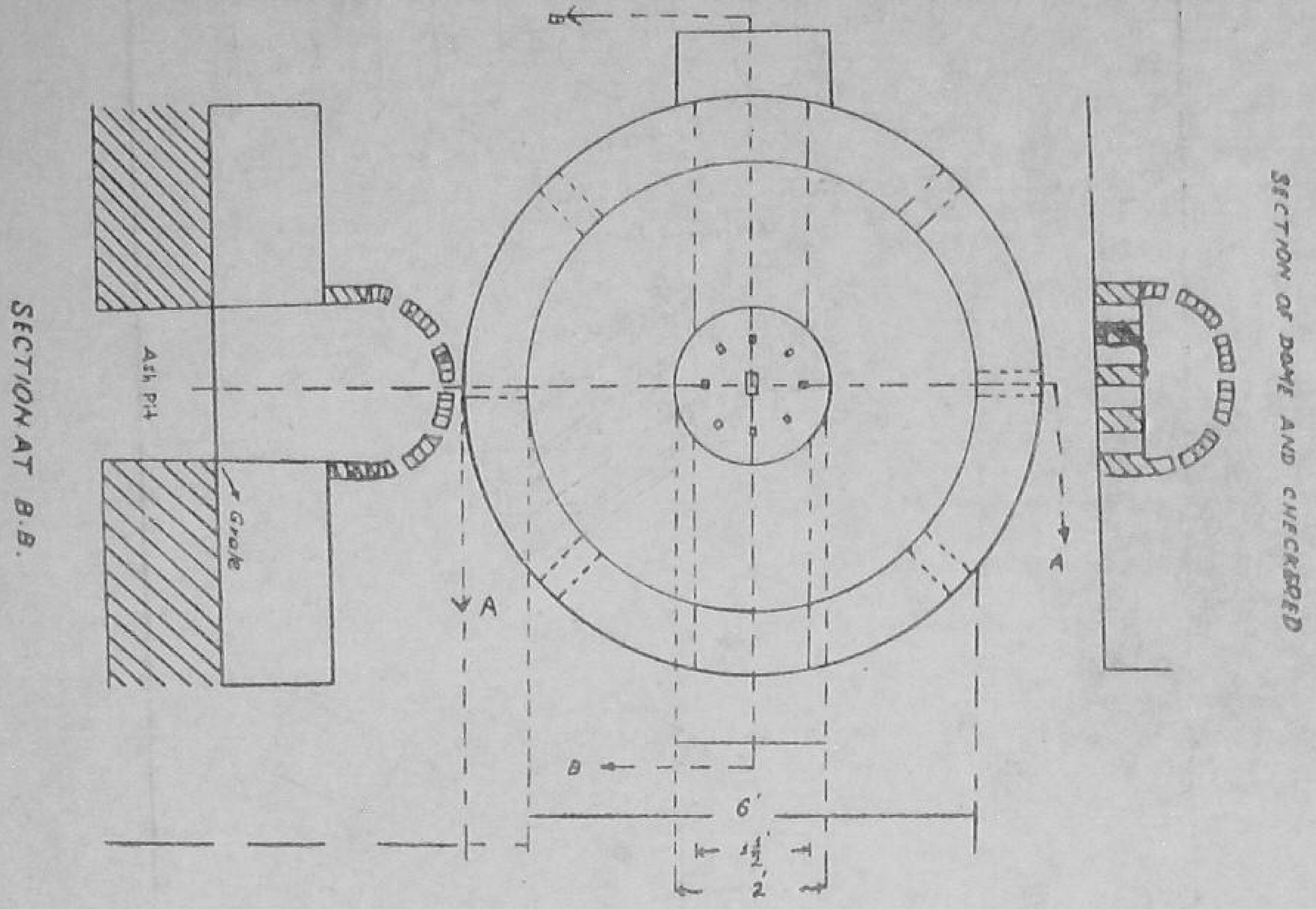


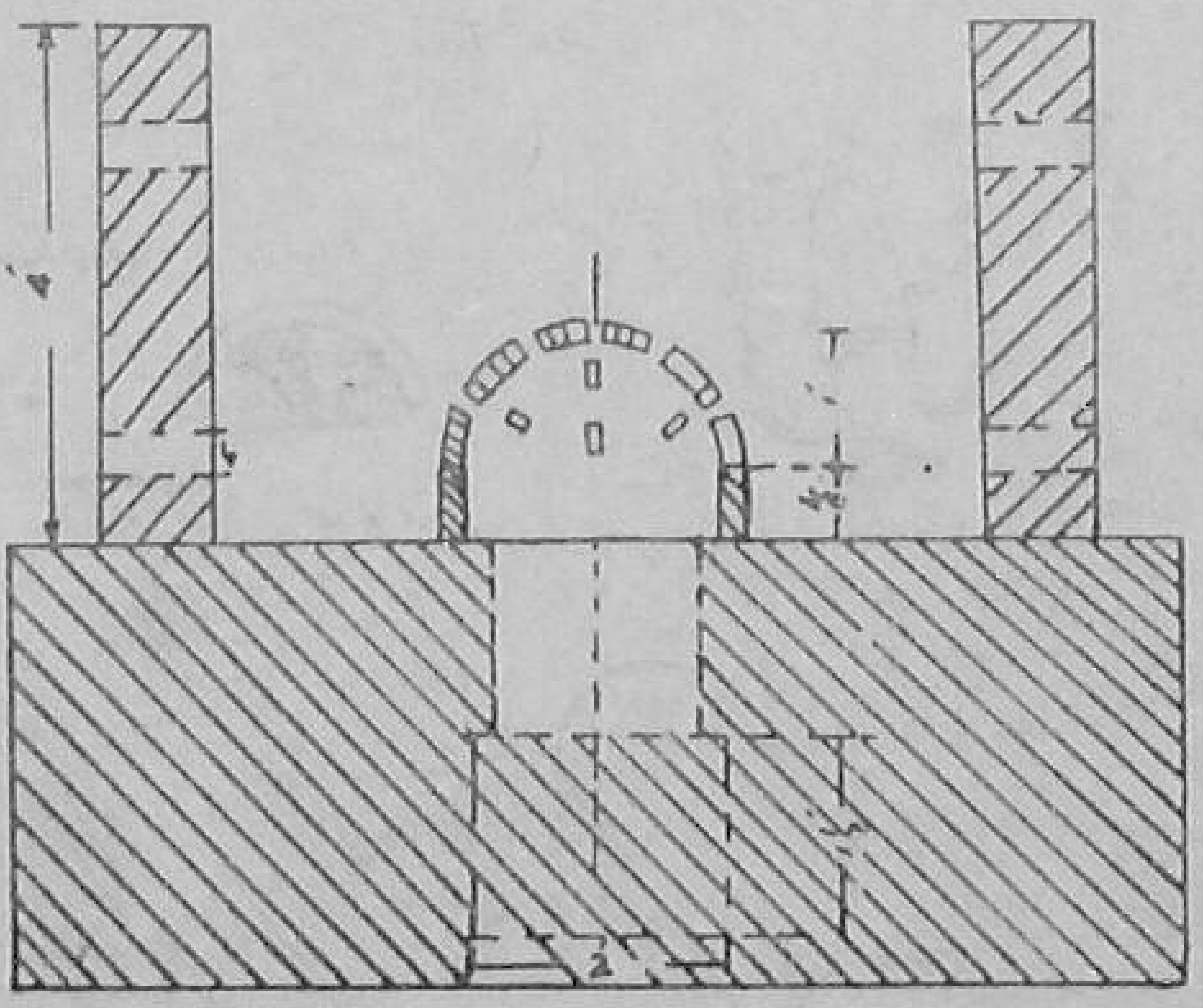
WINDOW CURTAIN

SITTING-MAT

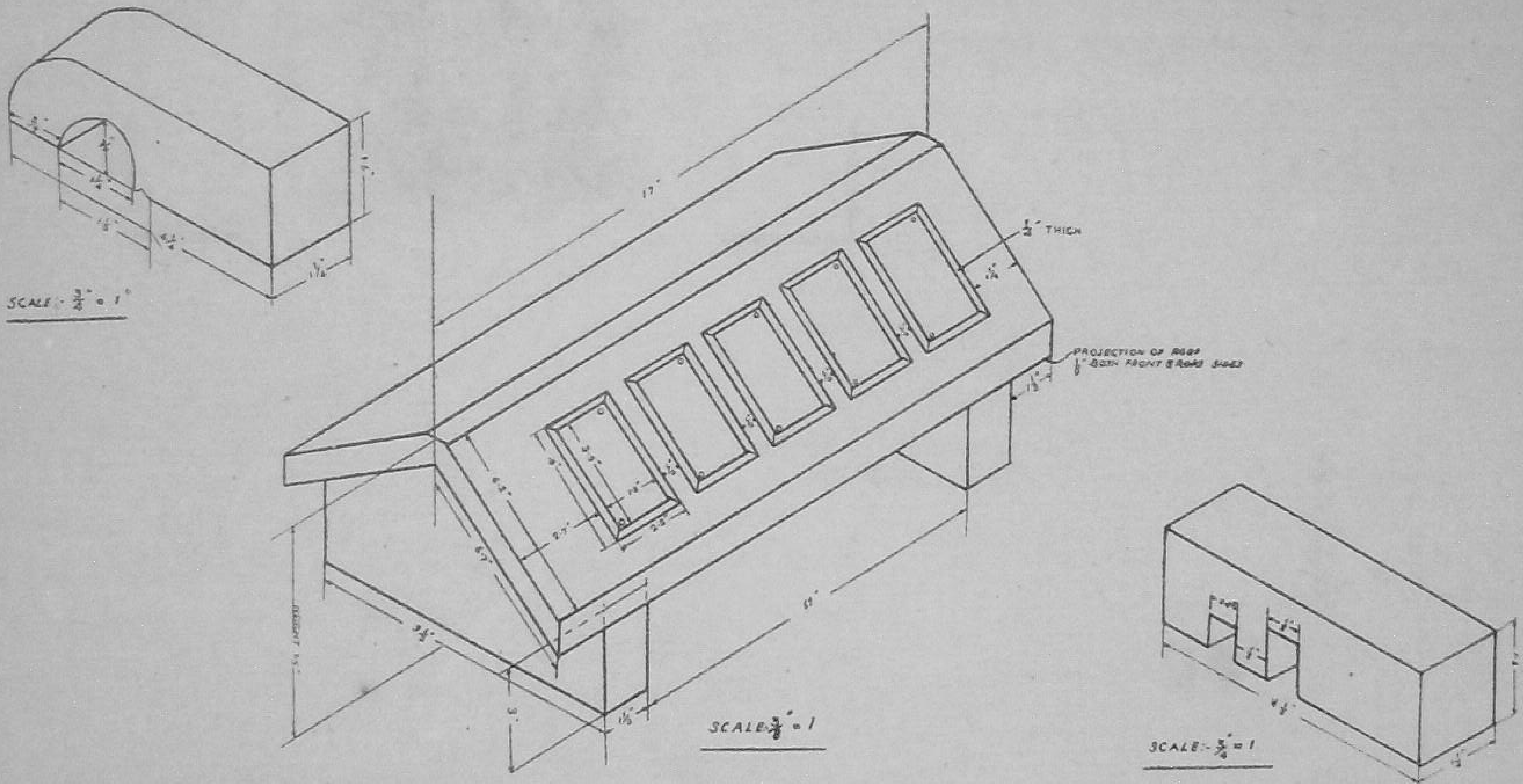

DRAWING NO 1
Plain Tiles
Fig 1
Fig 2
Fig 3
Fig 4
Fig 5
Fig 6
Interlocking Tiles
Fig 7
Ridge Tiles
Fig 8
Fig 9
Fig 10
Interlocking Tiles
Fig 11
Fig 12
Fig 13
Pan Tiles
Fig 14
Clay Paste
Wooden Mould
Fig 15
10
3
6
Fig 16
10
3
Fig 17

DRAWING No 3

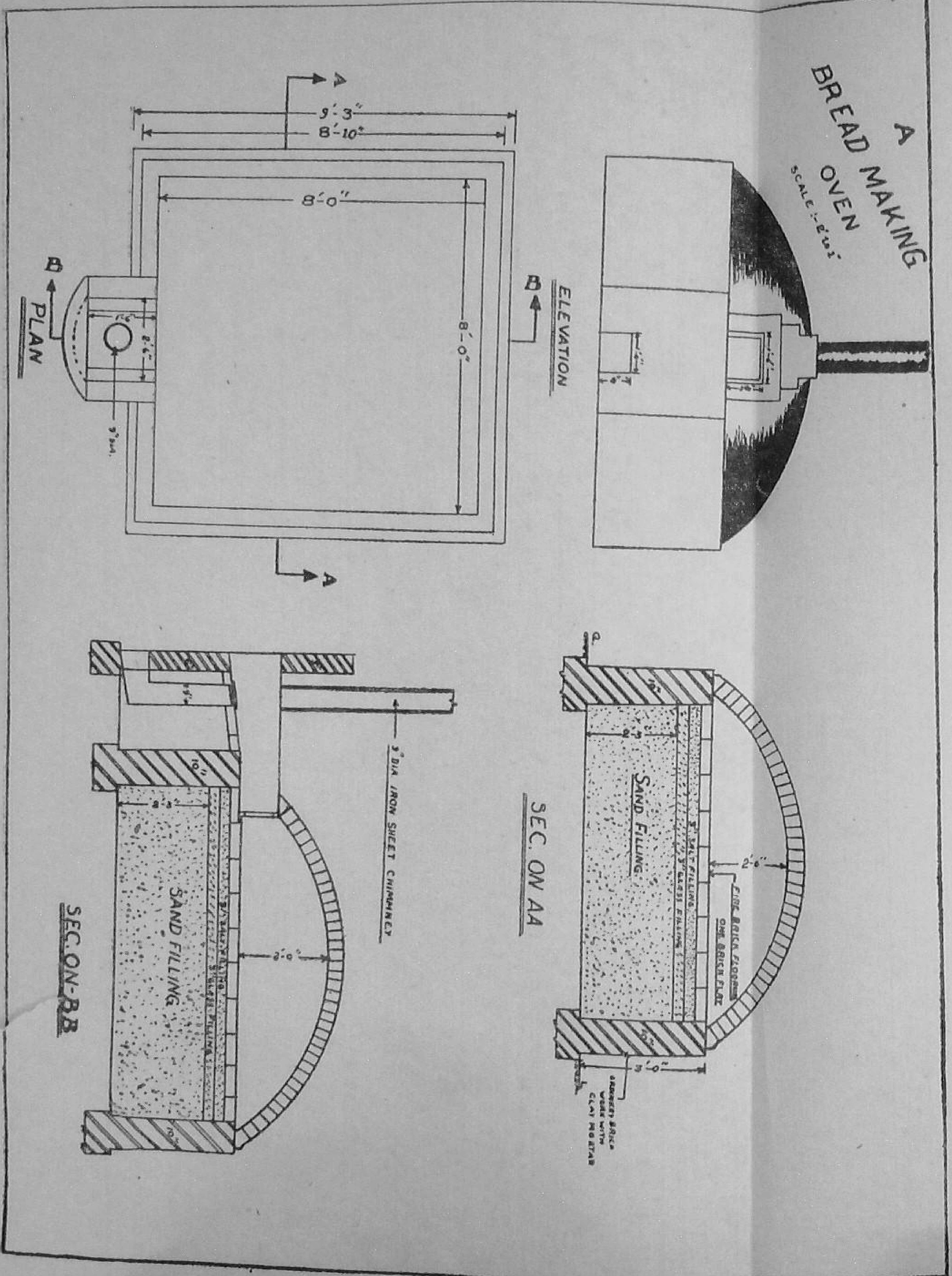


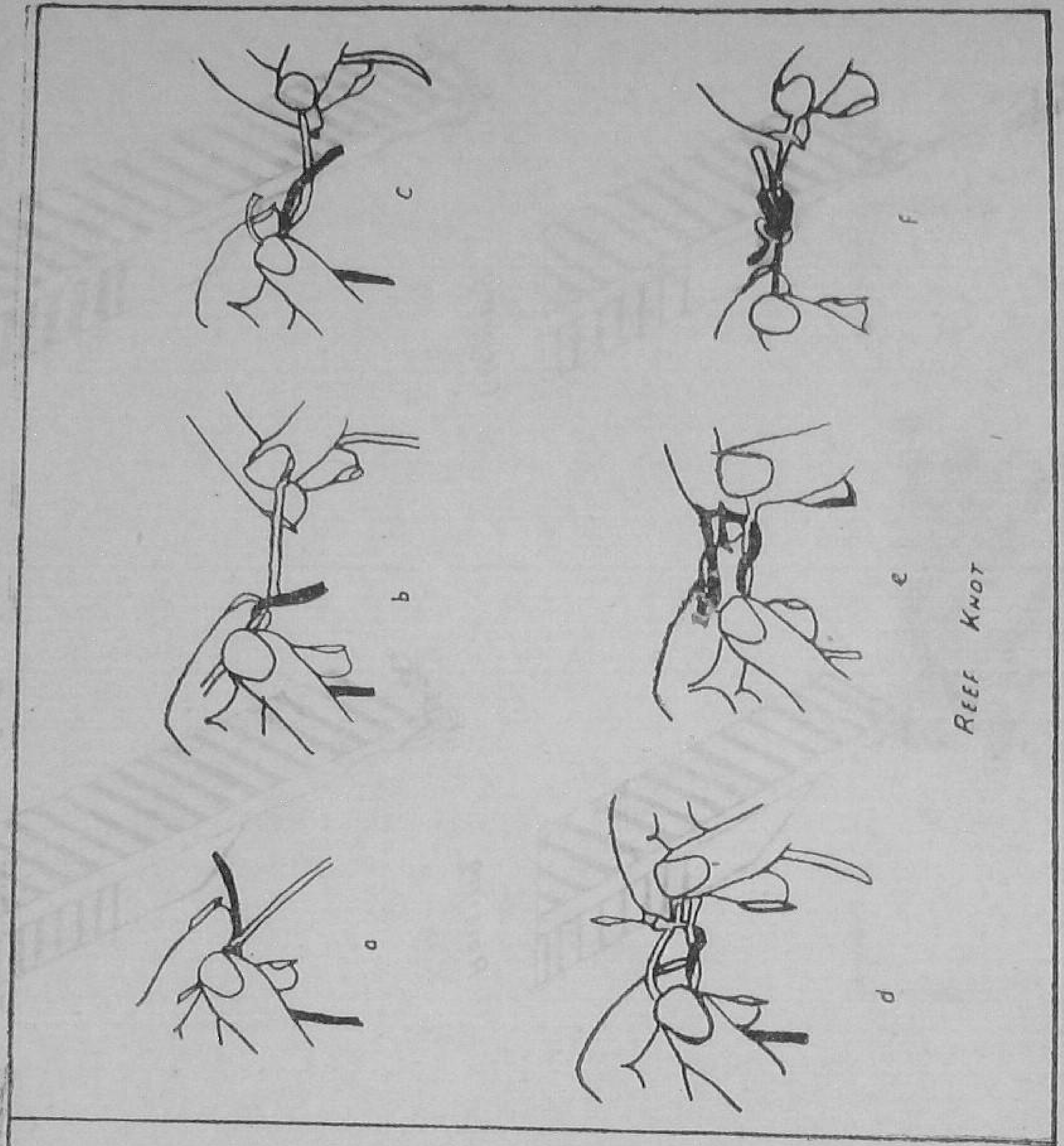


SECTION AT AA

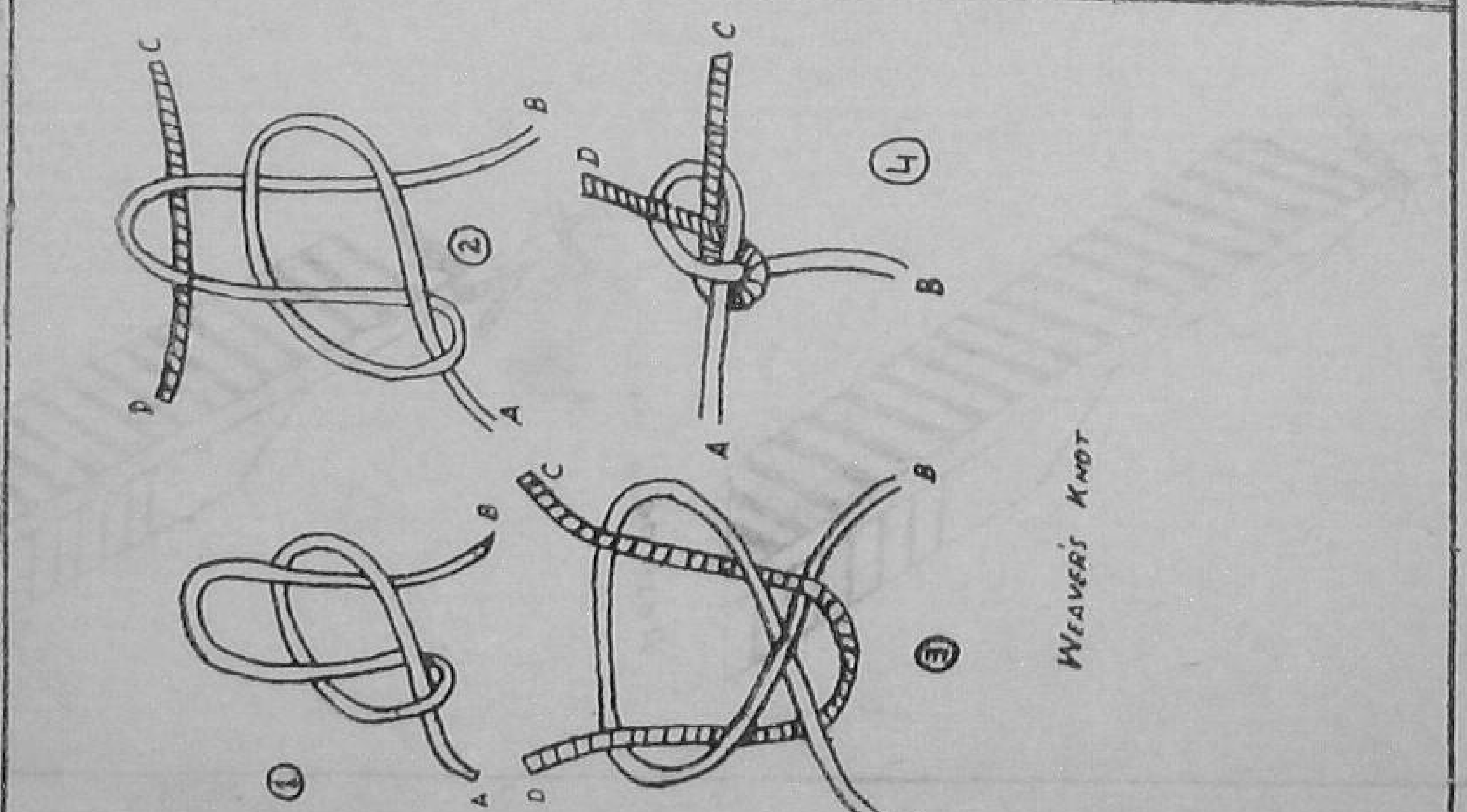


WOODEN MOULD
OF
RIDGE TILE

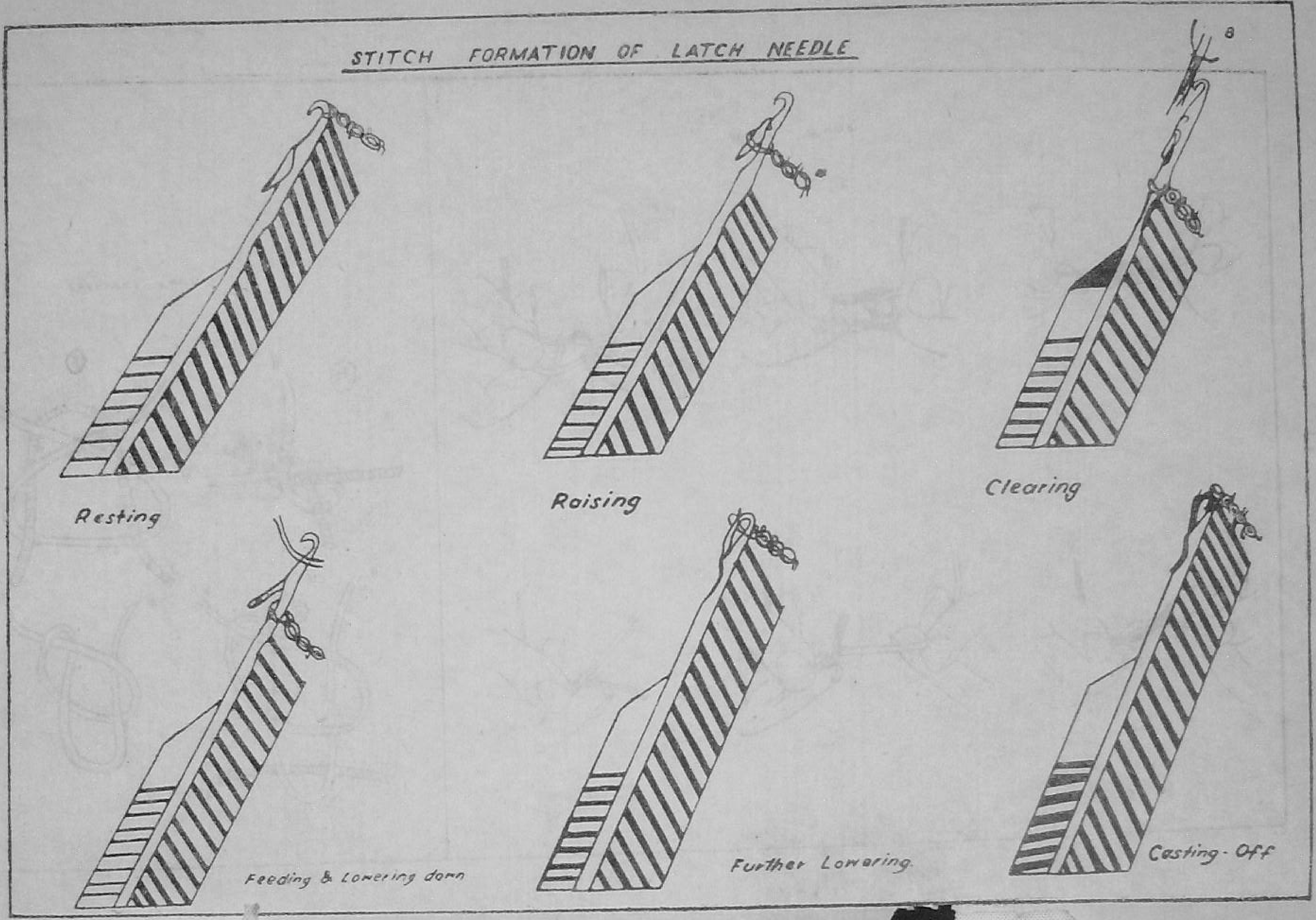

A
BREAD MAKING
OVEN
PLAN
ELEVATION
9'-3"
8'-10"
8'-0"
8'-0"
SEC. ON AA
SEC. ON-BB
SAND FILLING
SAND FILLING
9" DIA IRON SHEET CHIMNEY
2'-6"
2'-0"
3'-0"
10"
FIRE BRICK FLOOR
ONE BRICK FLAT



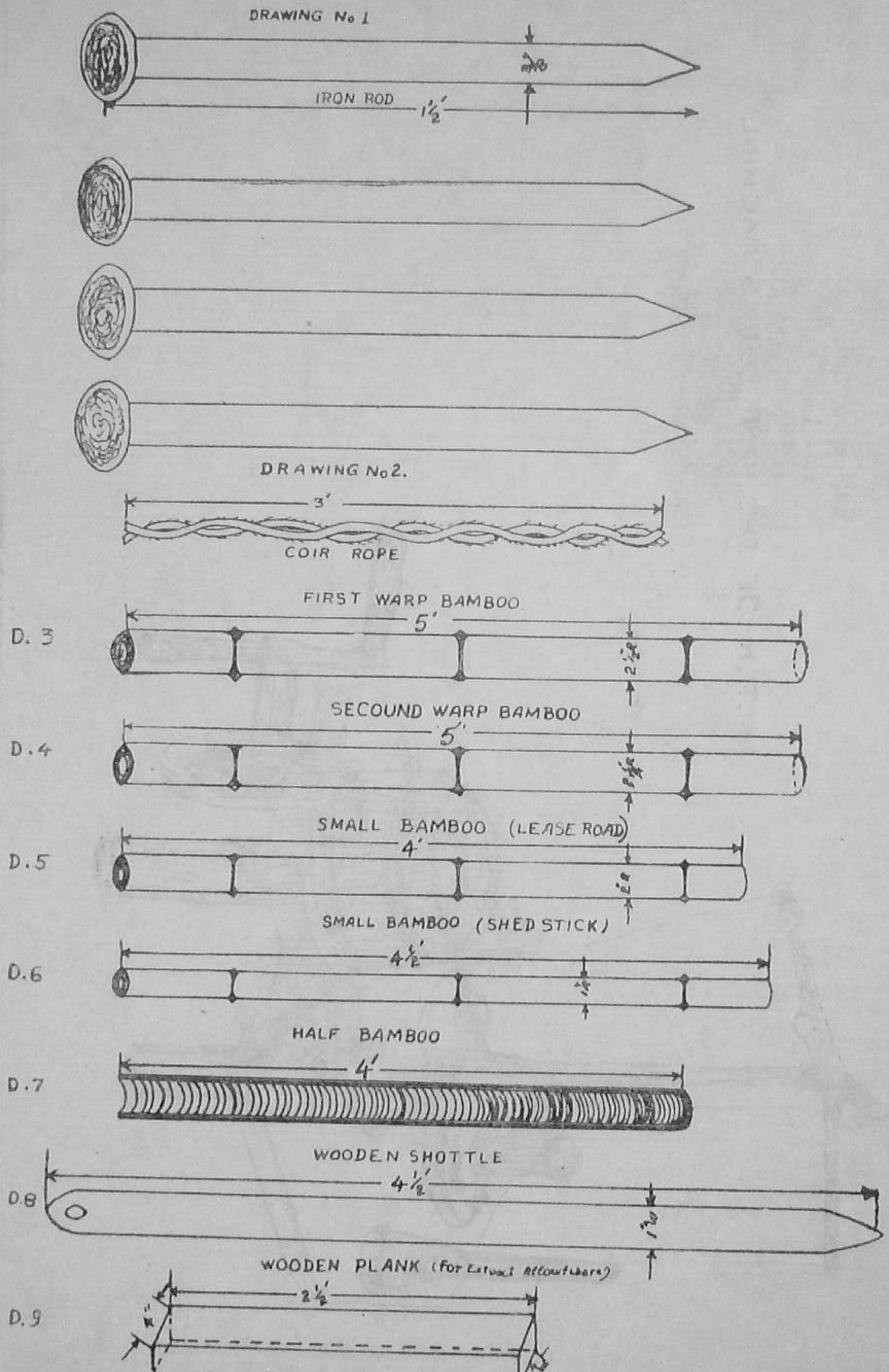
REEF KNOT



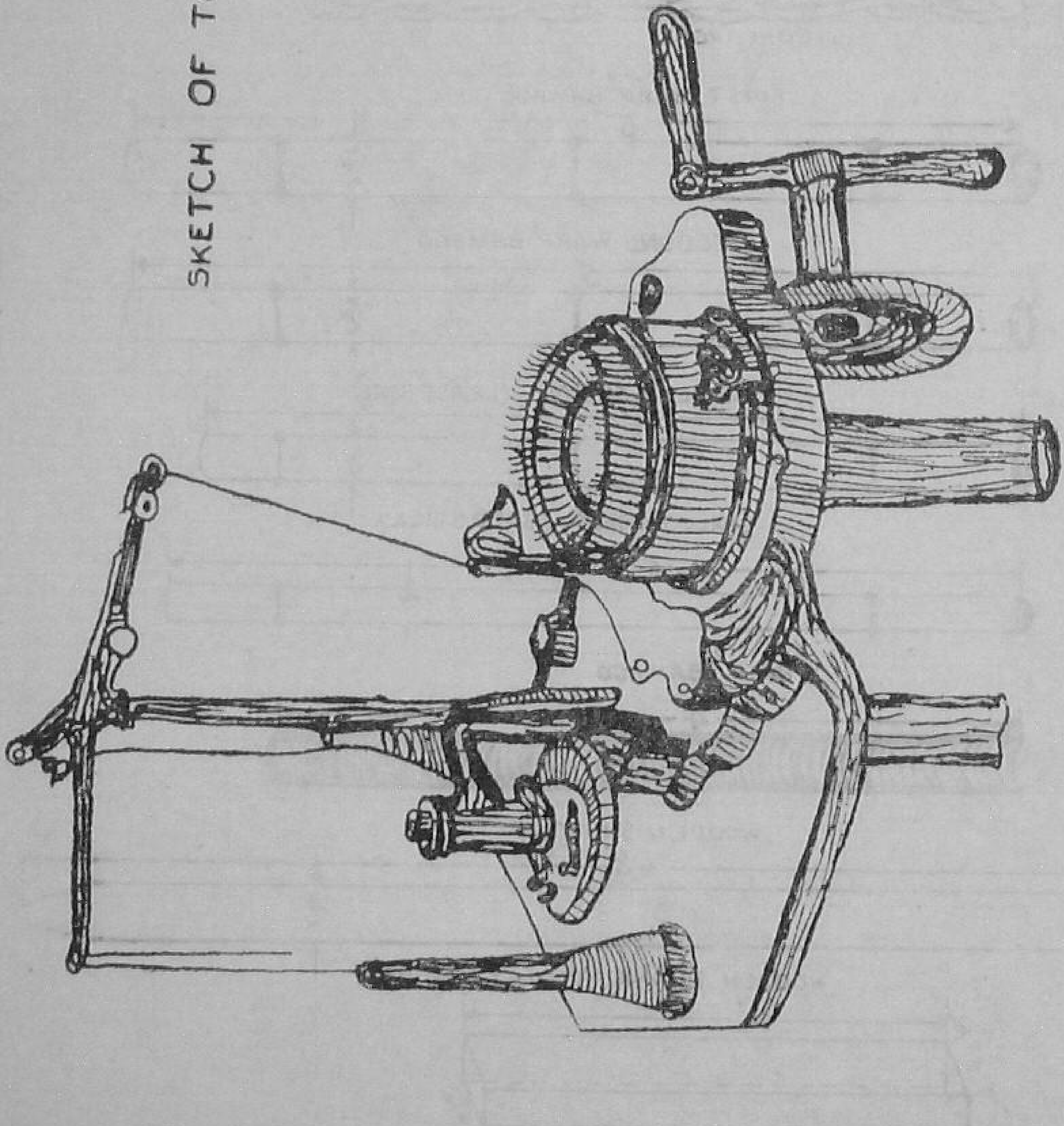
WEAVER'S KNOT


STITCH FORMATION OF LATCH NEEDLE
Resting
Raising
Clearing
Feeding & Lowering down
Further Lowering
Casting - Off

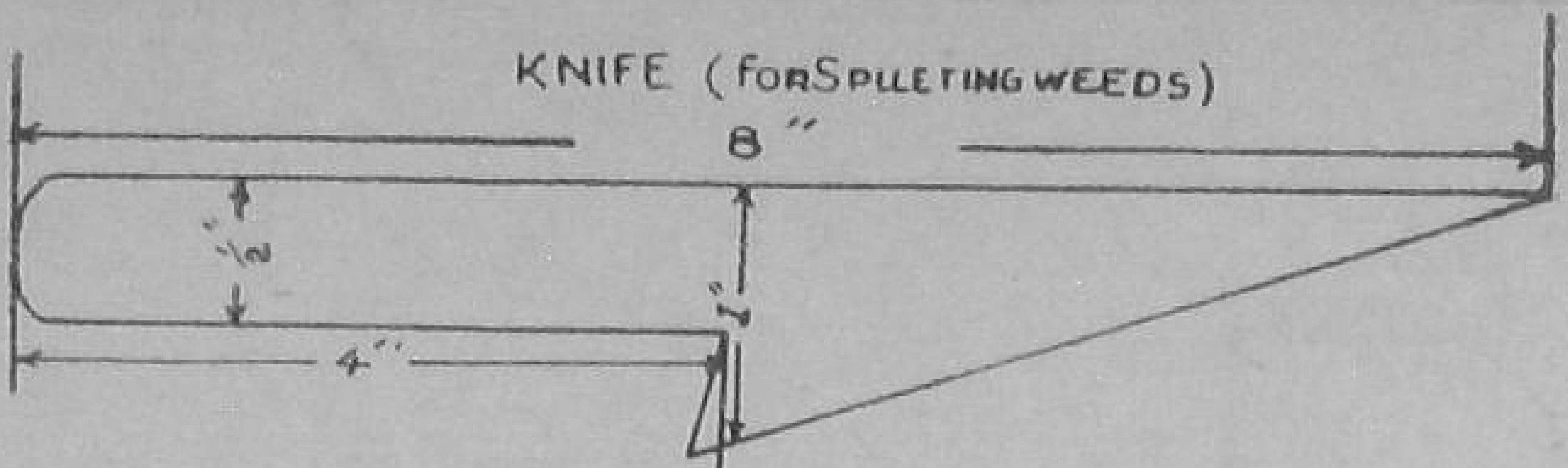
LIST OF EQUIPMENTS REQUIRED FOR MAT WEAVING INDUSTRY.



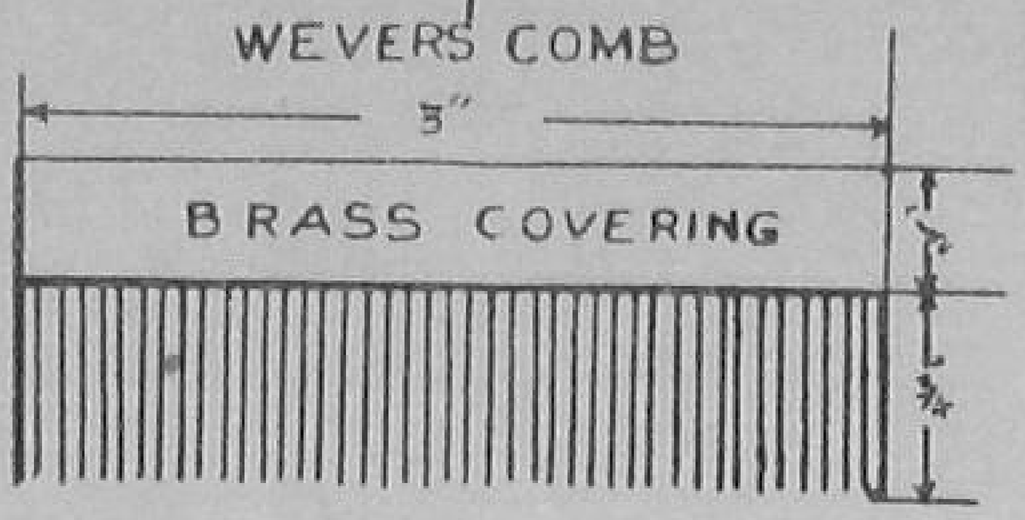
SKETCH OF THE HAND SOCKS MACHINE



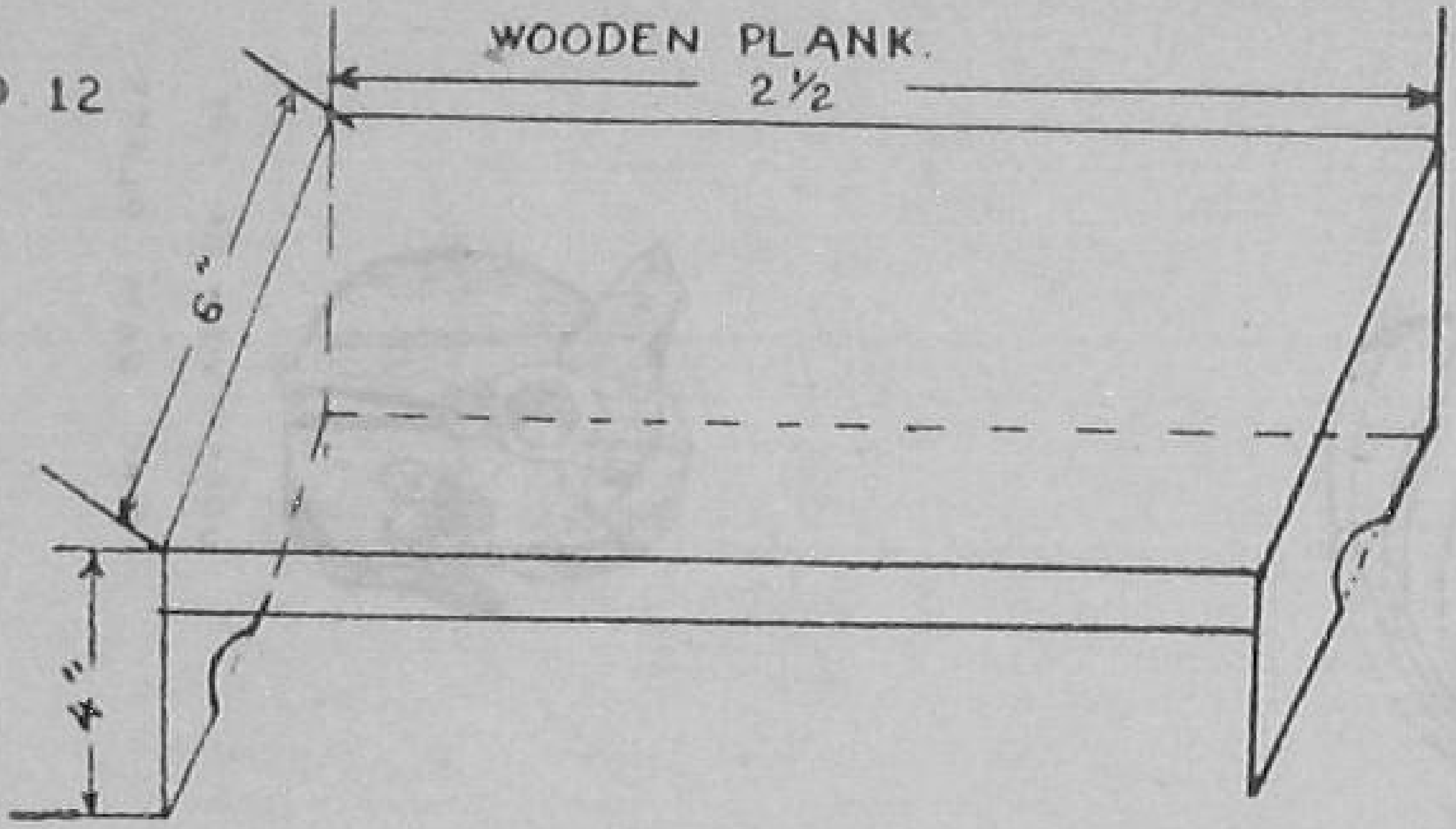
D.10



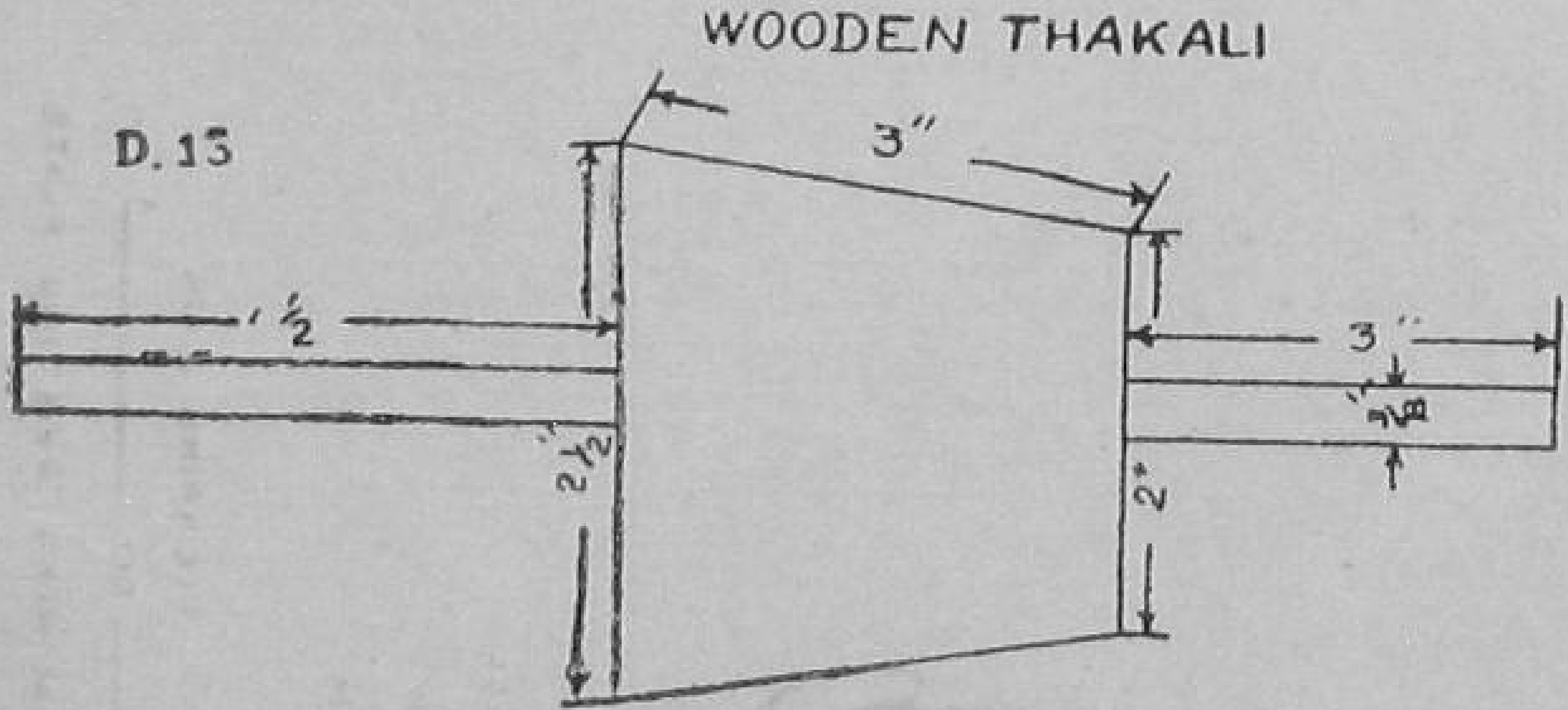
D.11



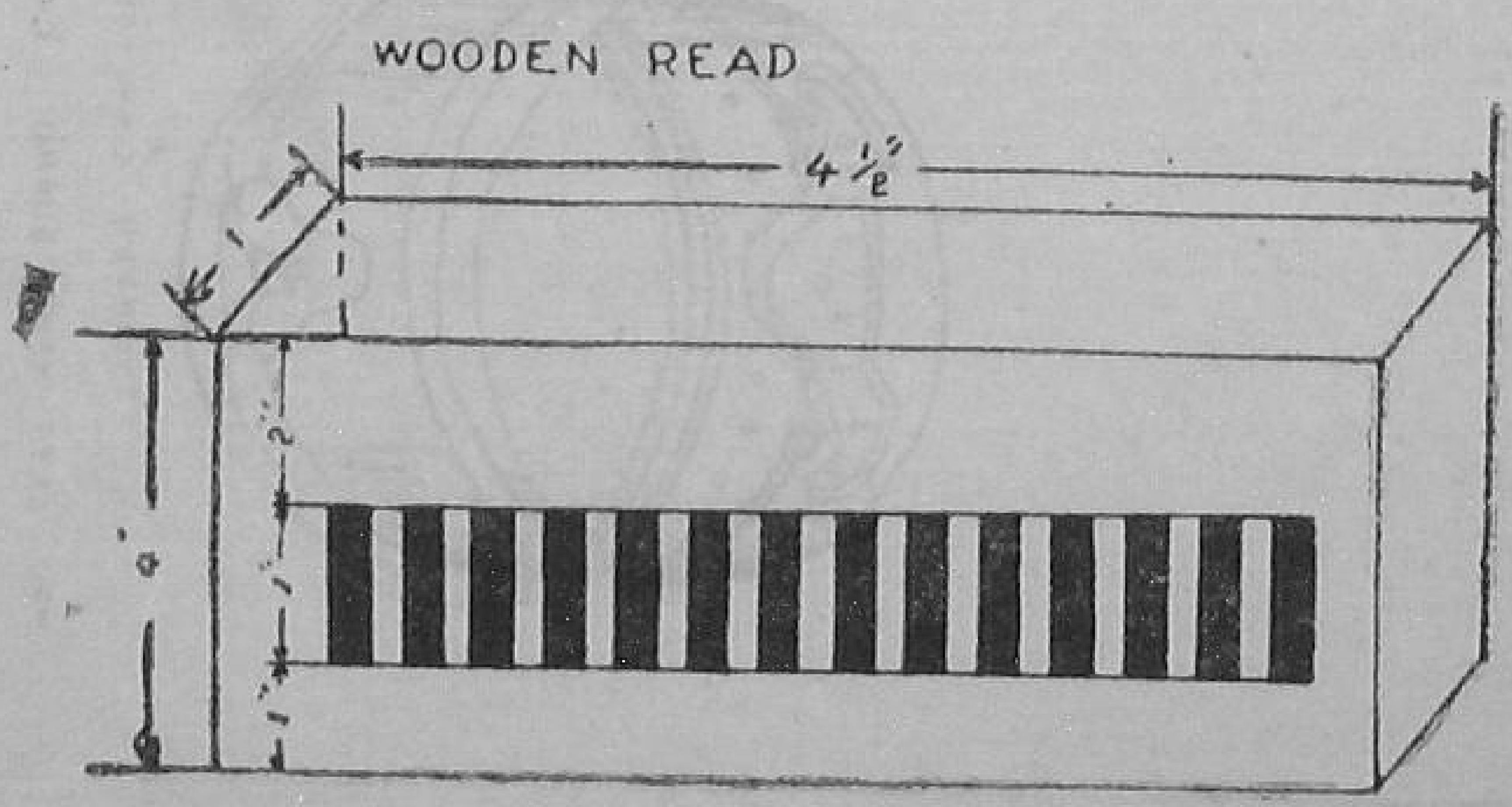
D 12

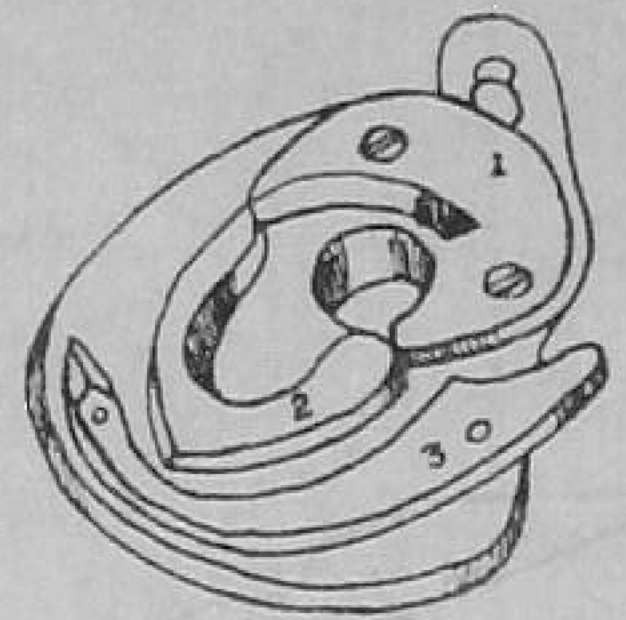


D.13



D14



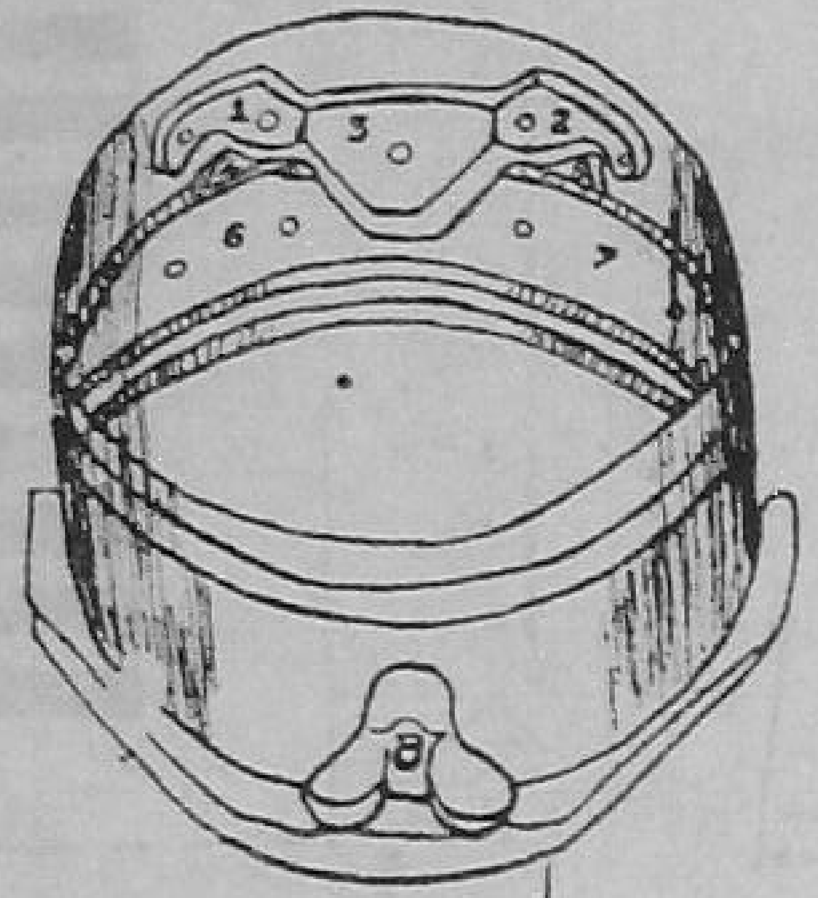


LOWER VIEW OF DIAL CAM PLATE

NO. 1 CENTRE CAM OR GUARD CAM

NO. 2. CLEARING CAM

NO 3. STITCH CAM



CYLINDER CAM SHELL

NO-1 LEFT HAND GUARD CAM

2 RIGHT HAND GUARD CAM

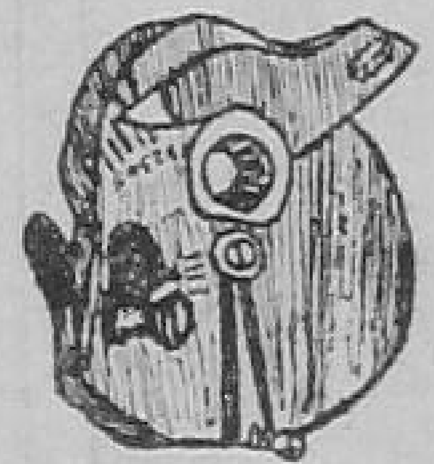
3 STITCH CAM

4. LEFT HAND RAISING CUM CLEARING CAM

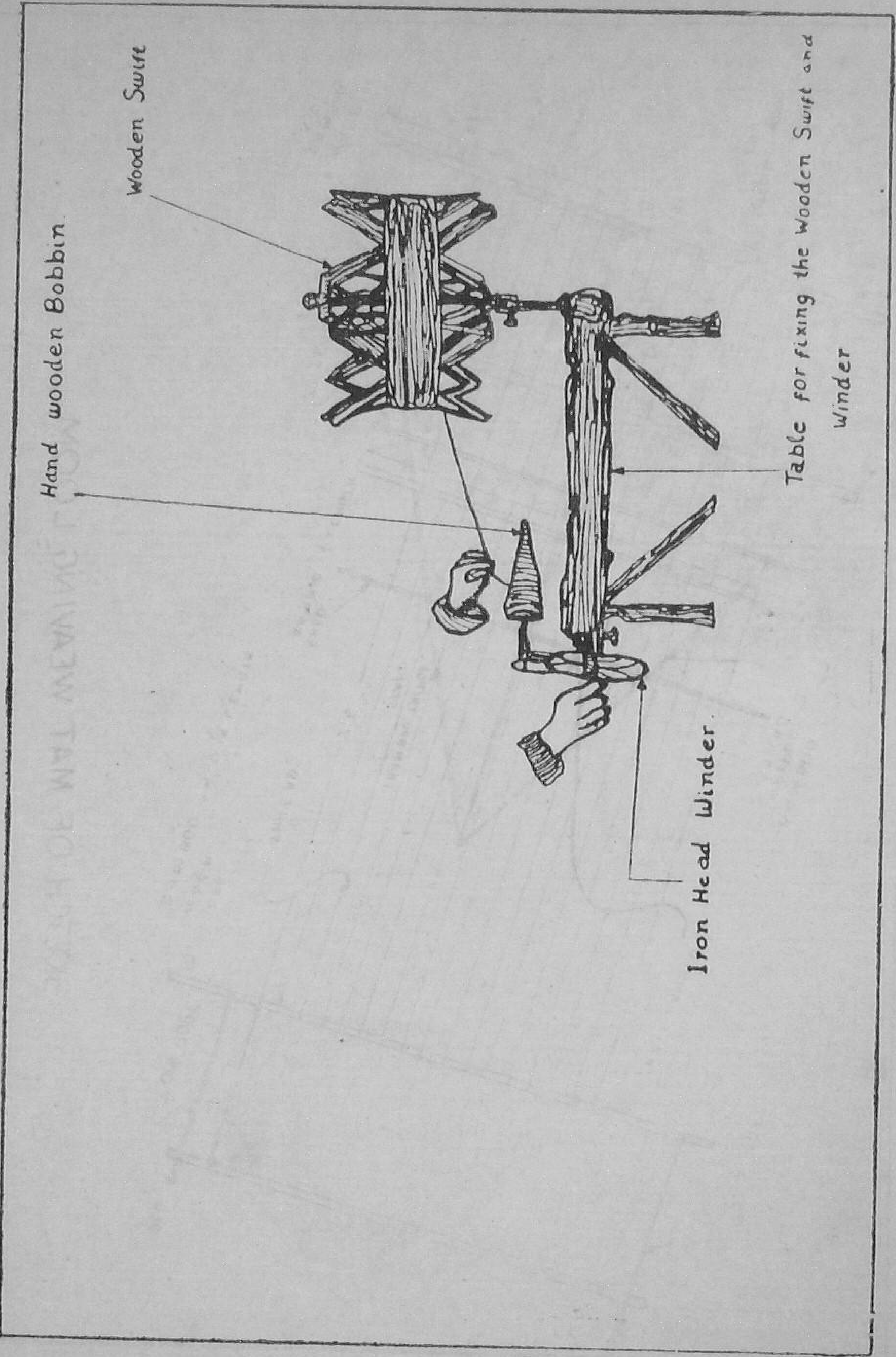
5. RIGHT HAND ———— DO ————

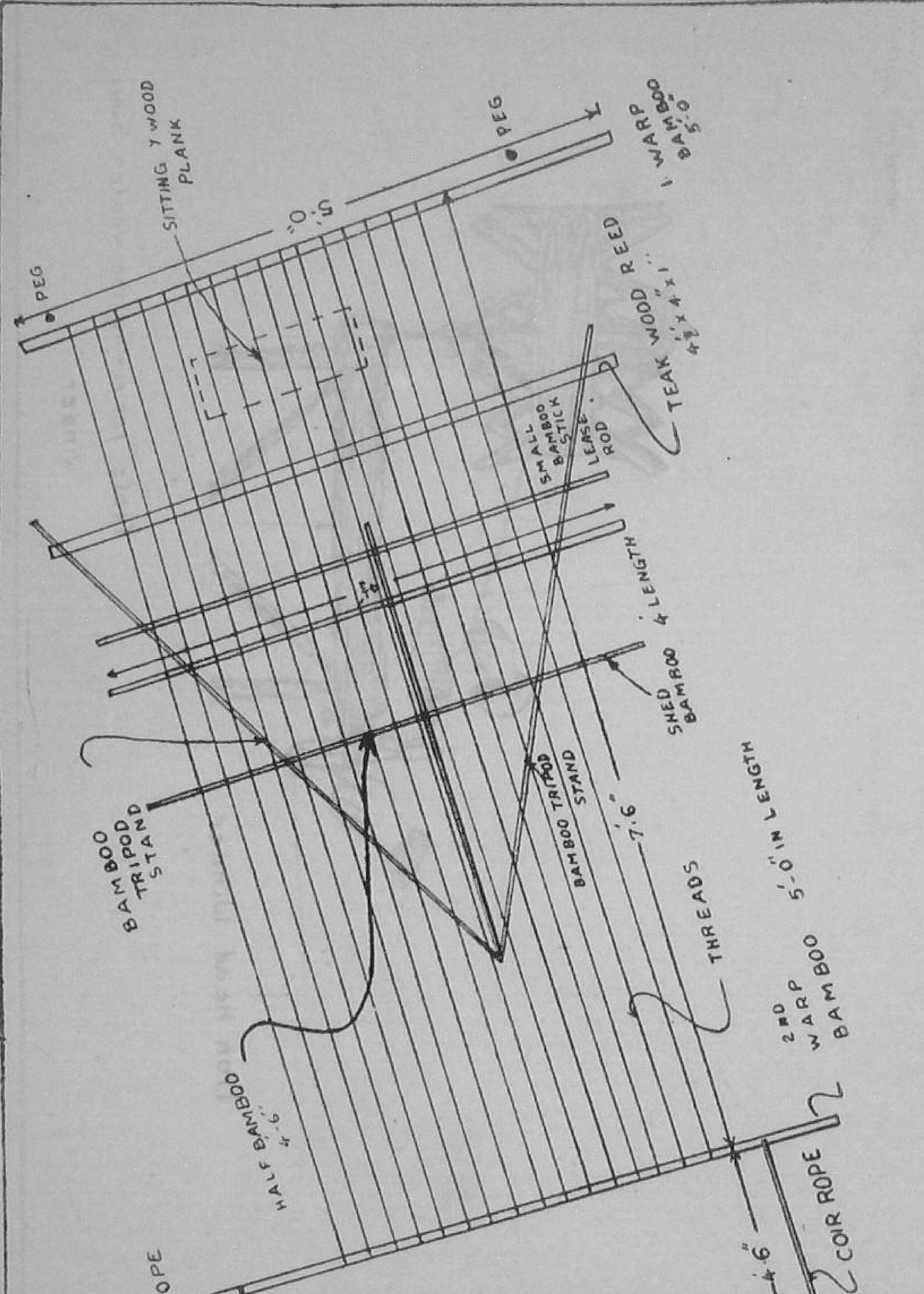
6. LEFT HAND UPTHROW CAM WITH RESTING PLATE

7 RIGHT HAND ———— DO ————



UPPER VIEW OF THE DIAL CAM PLATE

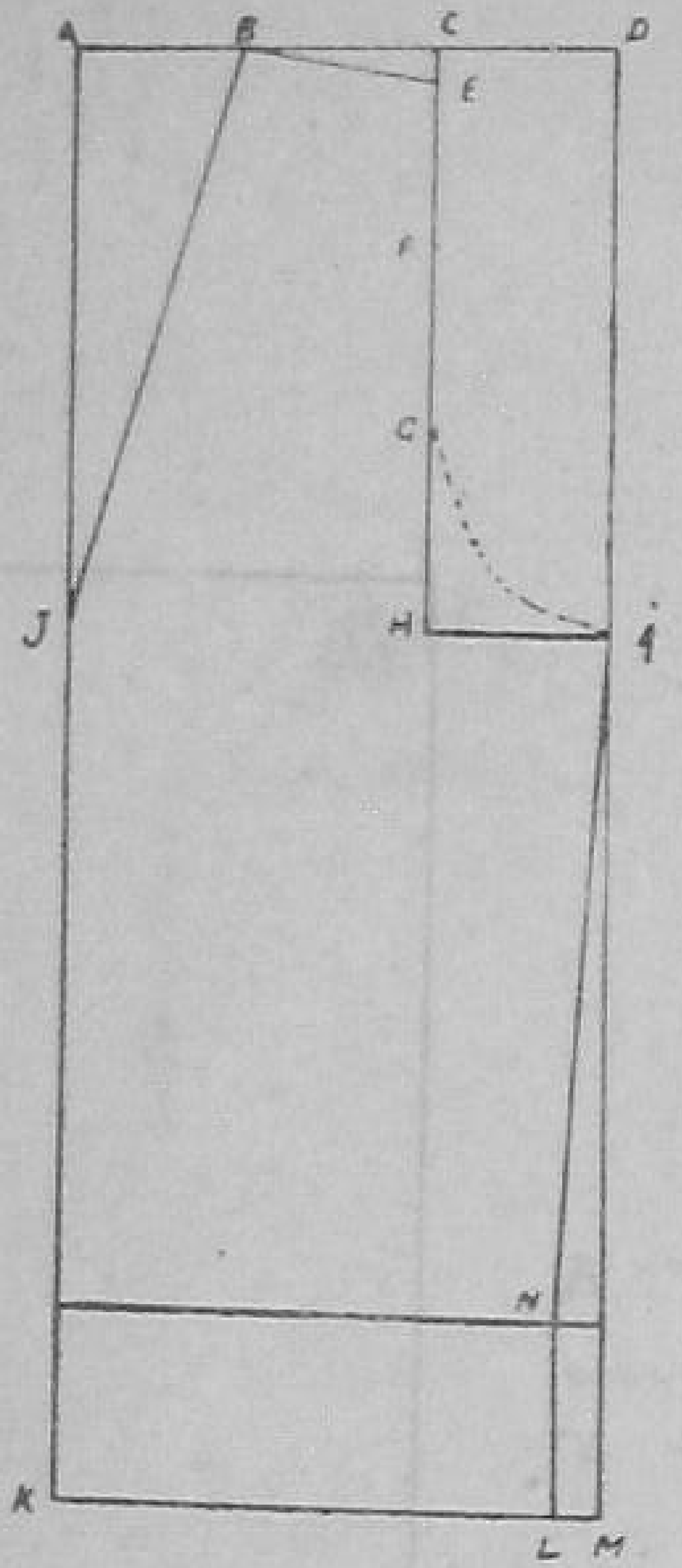

Hand wooden Bobbin
Wooden Swift
Table for fixing the Wooden Swift and Winder
Iron Head Winder



SKETCH OF MAT WEAVING LOOM

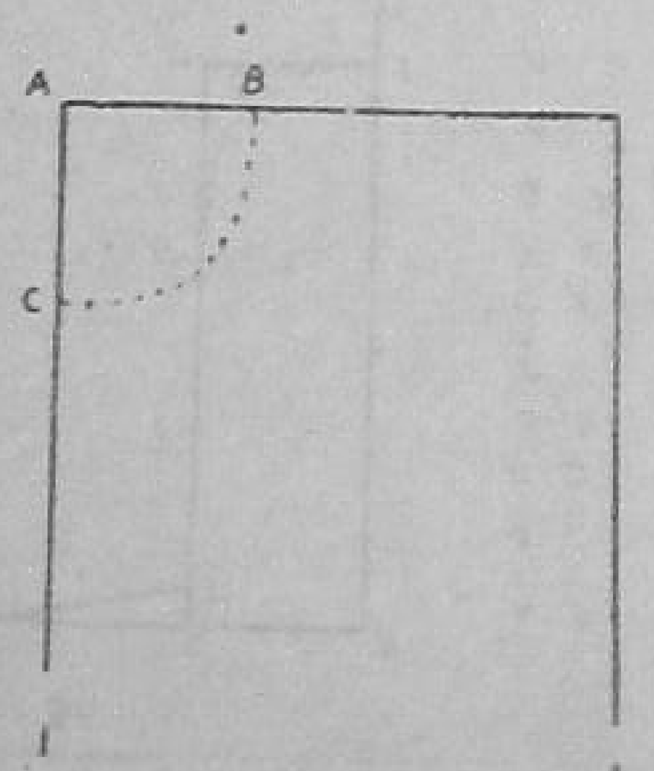
Hosiery Garments

Slip over V neck & Round neck



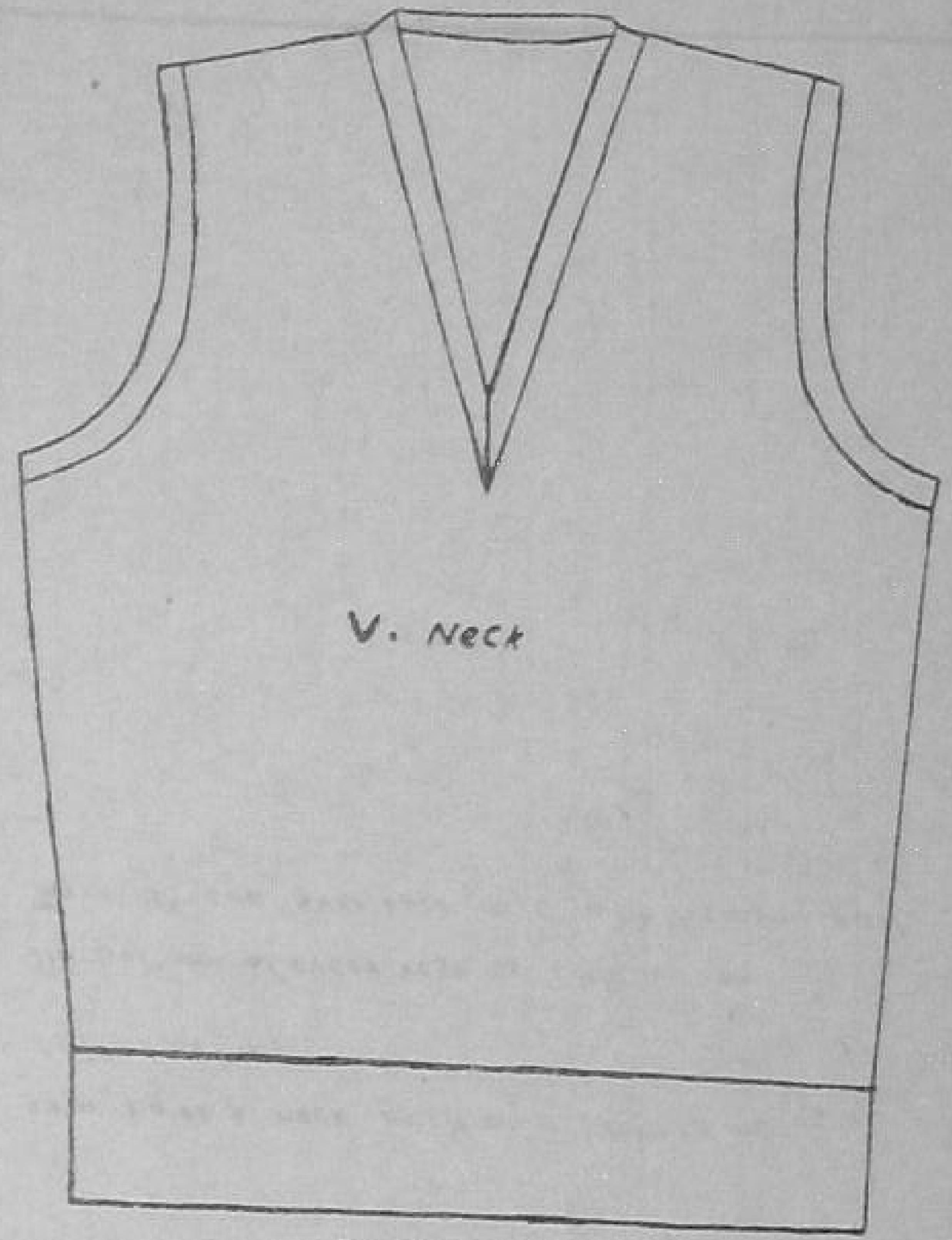
FRONT & BACK

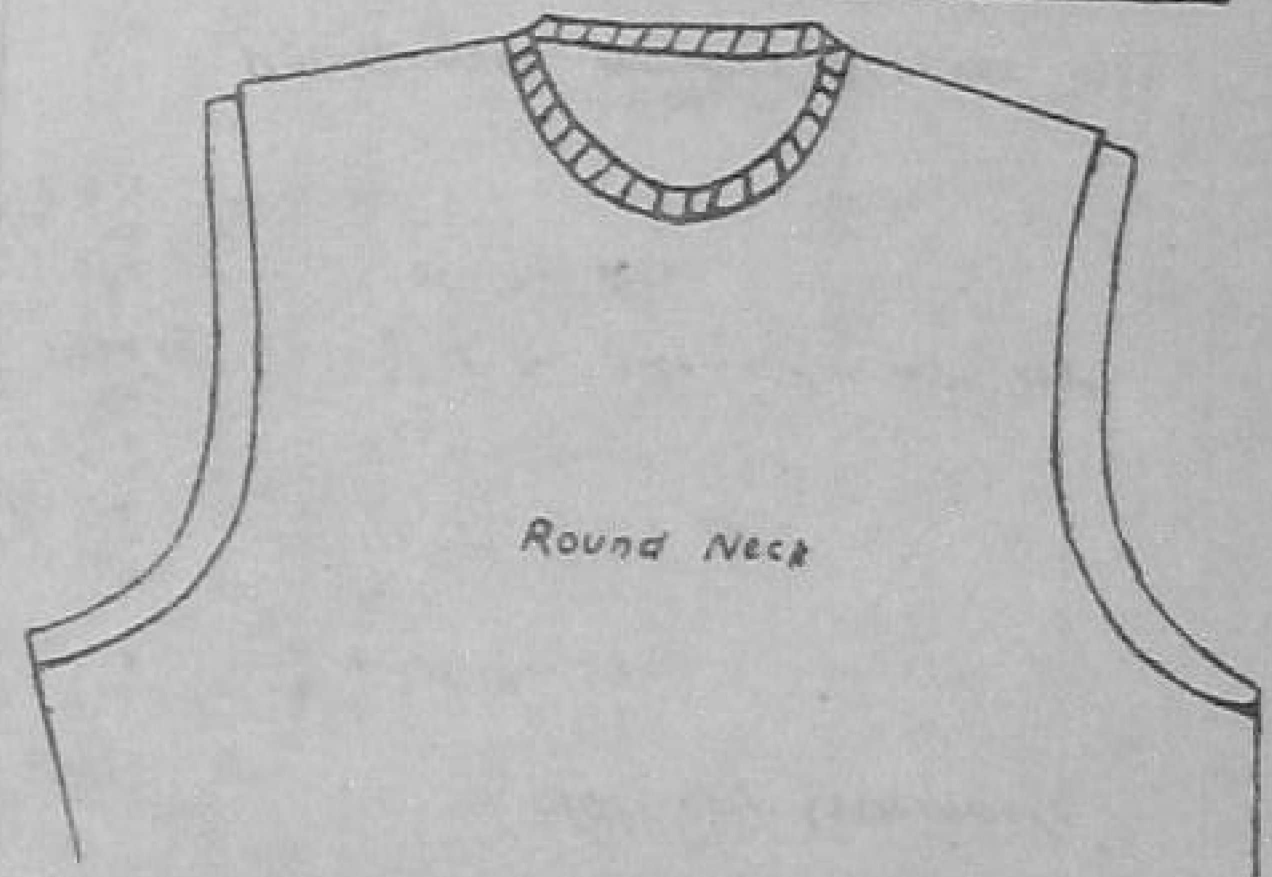
A D = $\frac{1}{4}$ of the size
A · B = $\frac{1}{12}$ of the size
A · J = $9\frac{1}{2}$"
A · K = 25"
C E = $\frac{3}{4}$"
C · H = $9\frac{1}{2}$"
C.F.F G.G H = $\frac{1}{3}$ of D I
L M = $\frac{1}{2}$"
L N = $3\frac{1}{2}$"
H · I = $\frac{1}{2}$ of the size



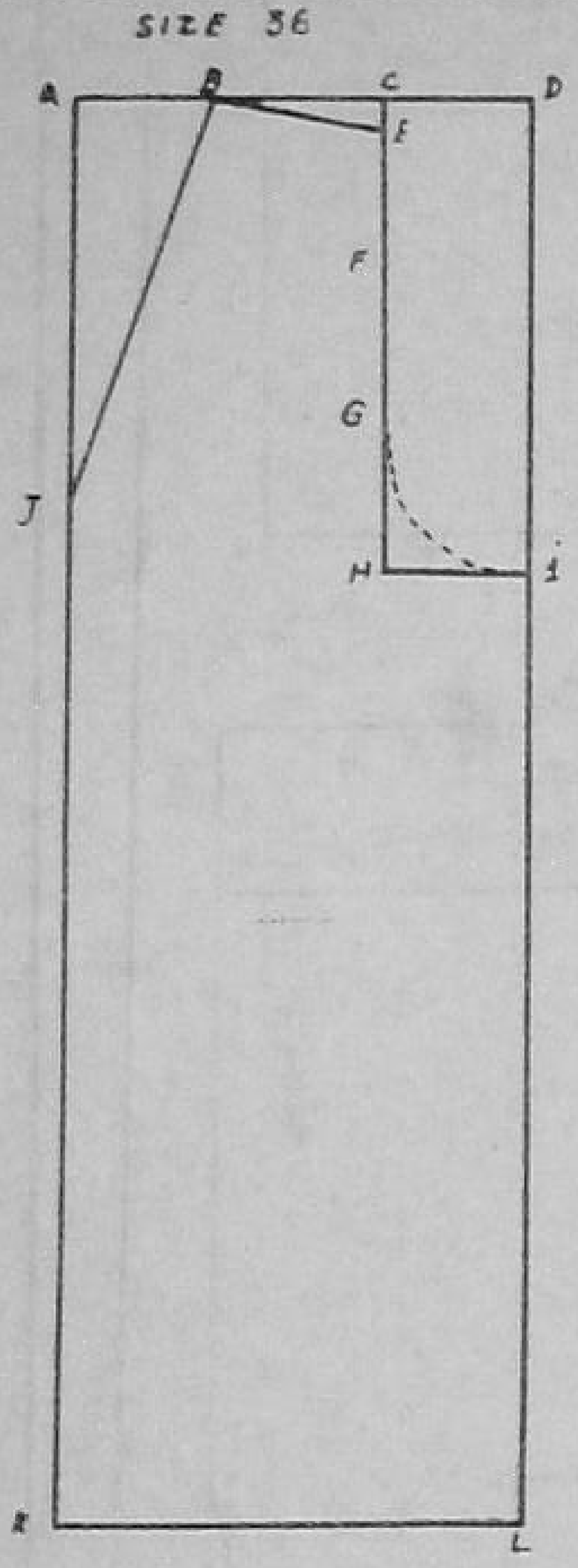
Round Neck.

A · B = $\frac{1}{12}$ of the size
A · B = $\frac{1}{12}$ of the size + 1"





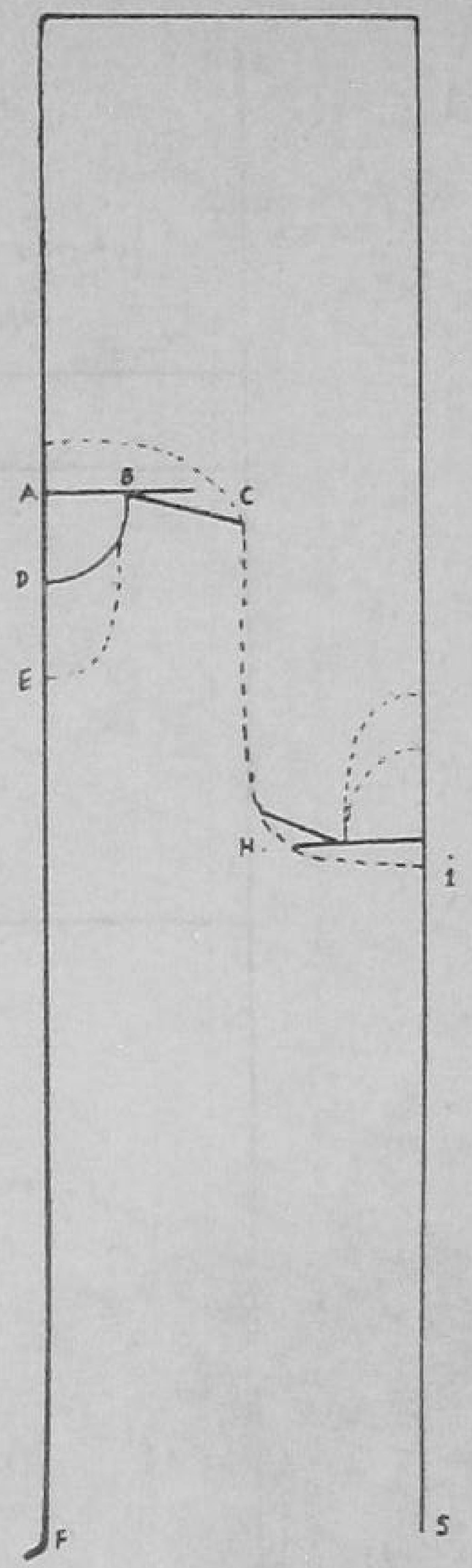
SIZE 36



A.B = 1/12 of the size
B.C = – Do –
C.D = – Do –
A.D = 1/4 of the size
C.E = 3/4" for all size
C.F, F.G, G.H } 1/3 of C.H
A.J = 8"
A.K = 3/4 of the size + 2"
K.L = 1/4 of the size

It is stitched on Three Thread over-lock m/c.

V. neck without sleeves vest.



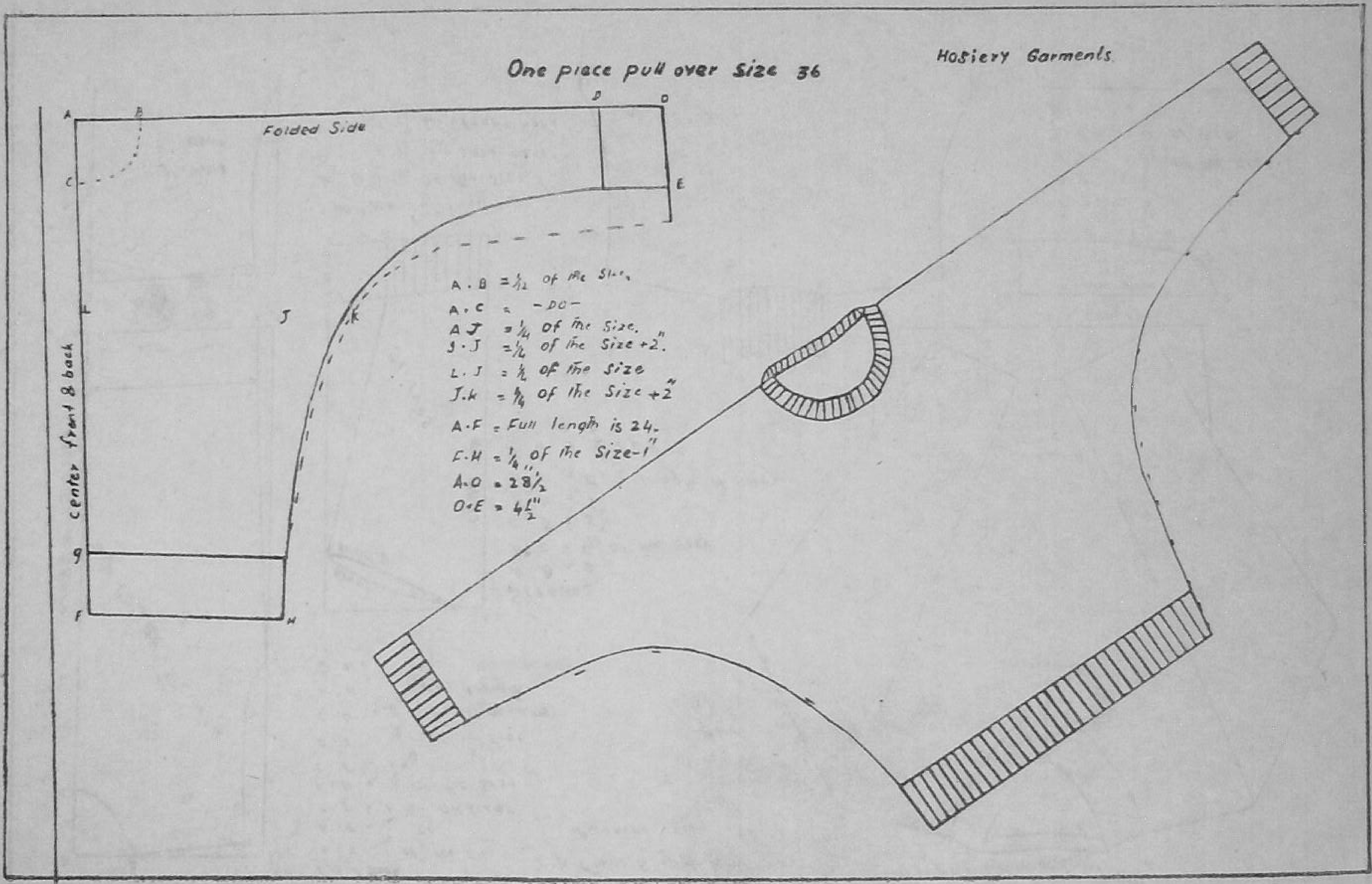
Hosiery Garments

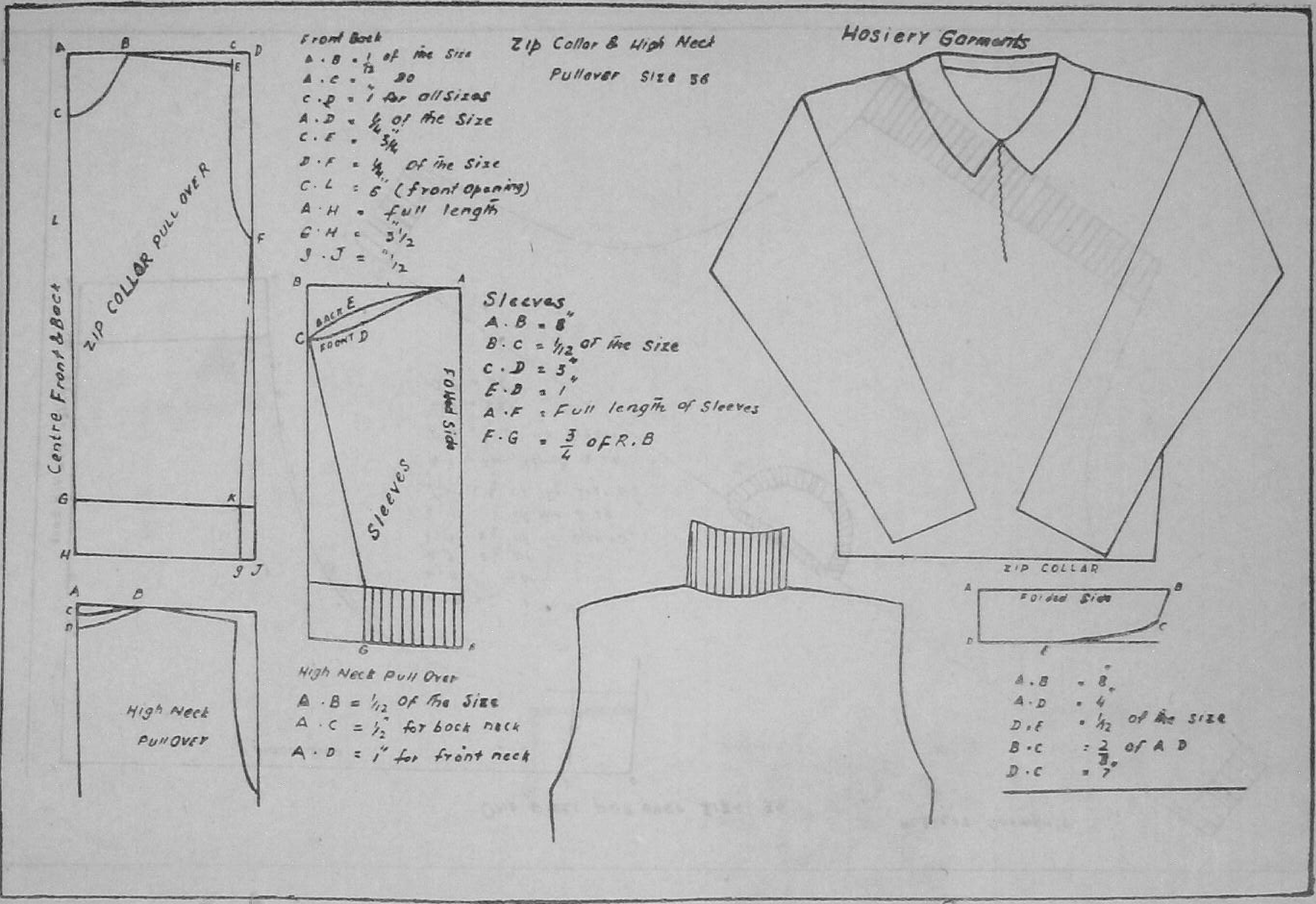
A.C = 1/8 of the size
A.B = 1 1/2"
A.D = 2 1/2" for back neck
A.E = 5 1/2" for front.
A.F = 3/4 of the size + 2" for full length.
F.G = 1/4 of the size

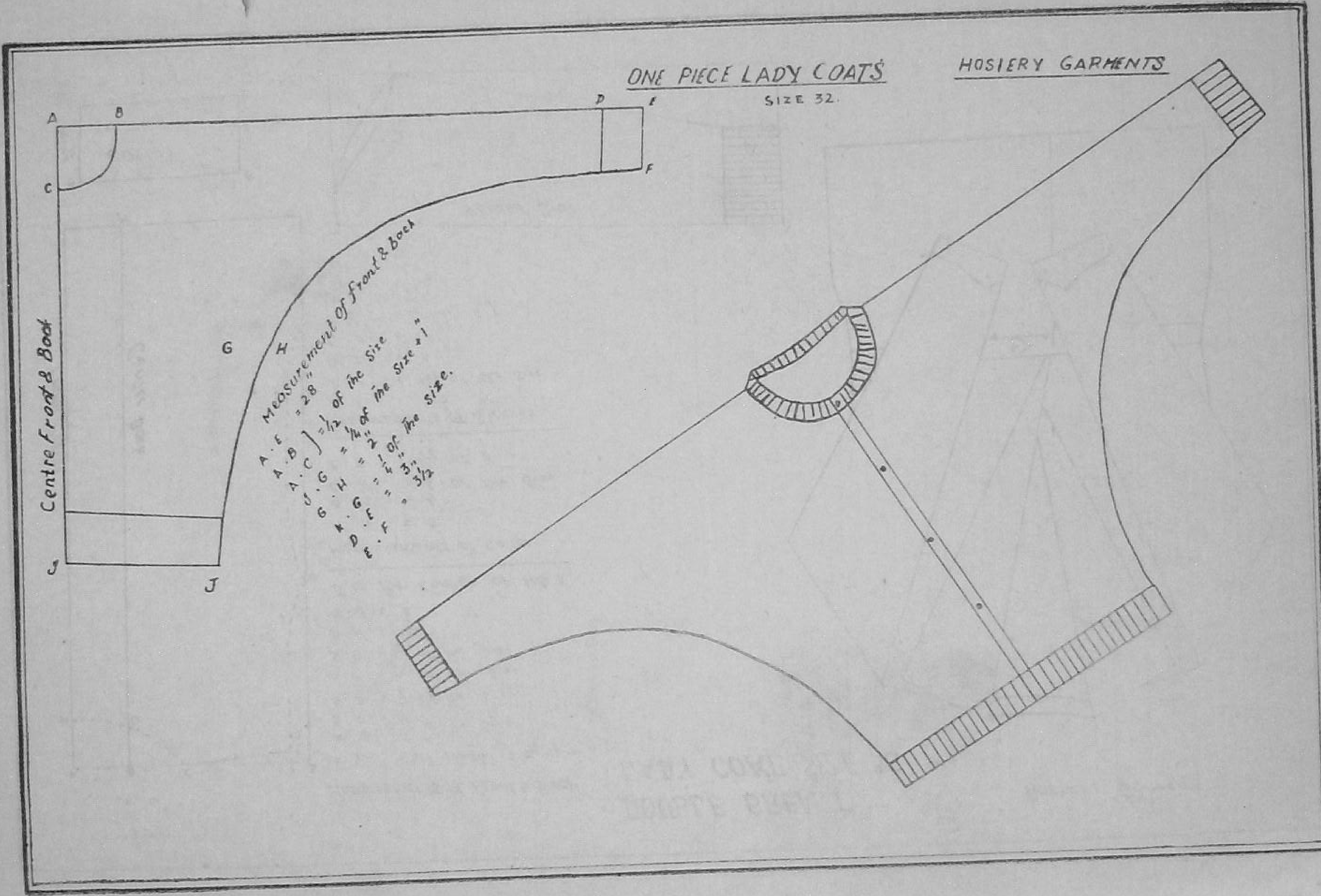
ROUND NECK WITHOUT SLEEVES VEST

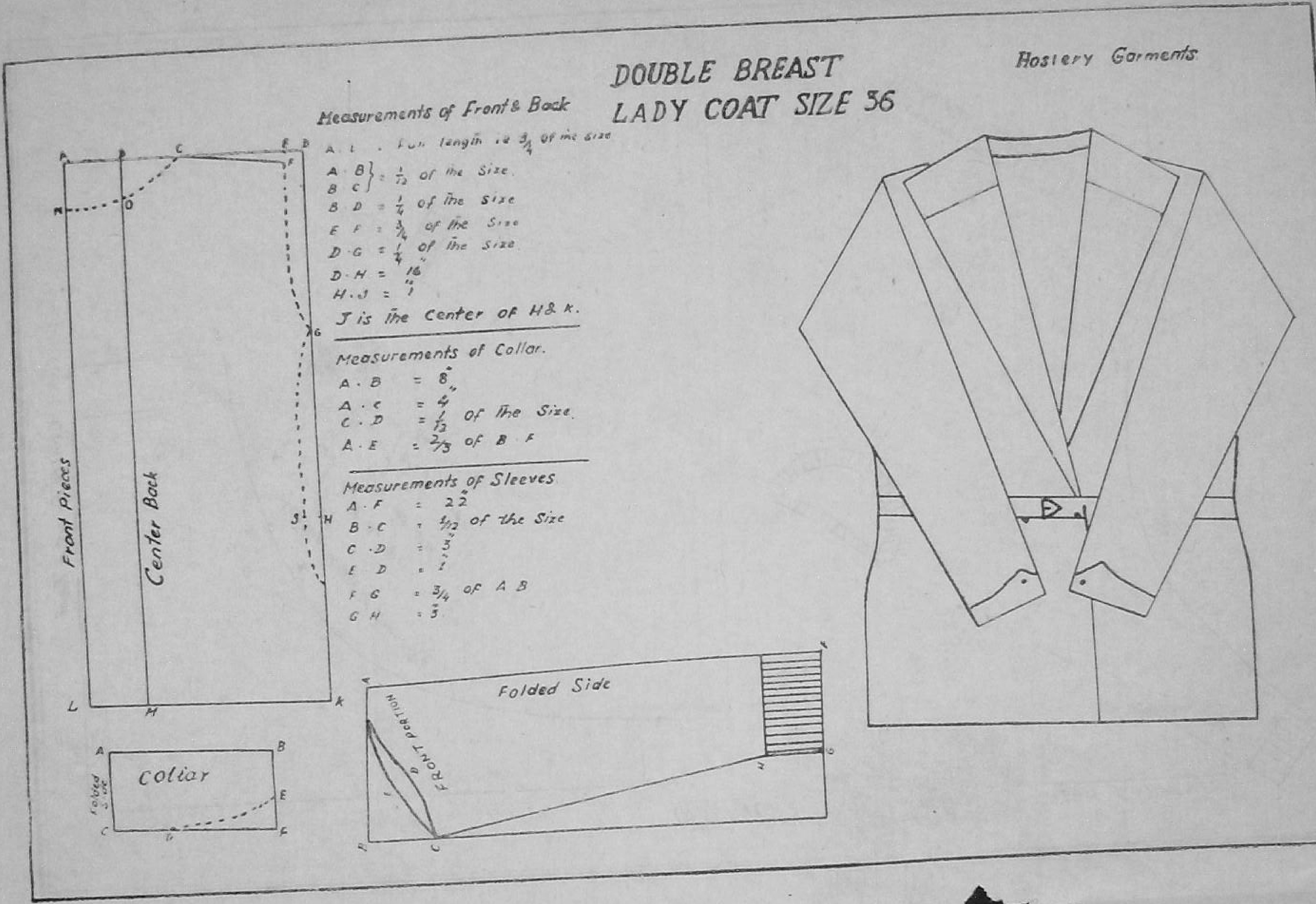
Arm holes & neck position is stitched on Flat-lock m/c.

The bottom of every vest is stitched on Three thread over back m/c with heming part.

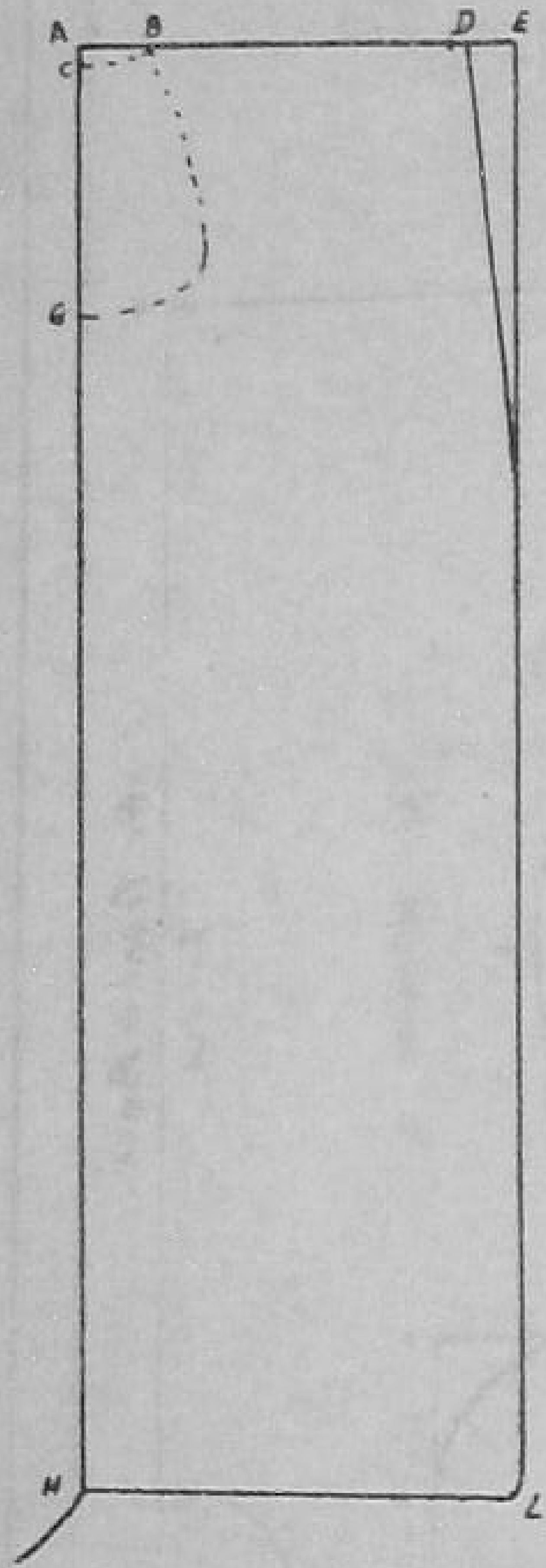

One piece pull over Size 36
Hosiery Garments
Folded Side
center front & back
A . B = 1/12 of the Size
A . C = -DO-
A J = 1/4 of the Size.
g . J = 1/4 of the Size + 2".
L . J = 1/2 of the Size
J . k = 1/4 of the Size + 2"
A . F = Full length is 24.
F . H = 1/4 of the Size - 1"
A . O = 28 1/2"
O . E = 4 1/2"


Hosiery Garments
Zip Collar & High Neck
Pullover Size 36
Front Back
A · B = 1/12 of the Size
A · C = " 20
C · D = 1" for all Sizes
A · D = 1/4 of the Size
C · E = 3/4"
D · F = 1/4 Of the Size
C · L = 6" (front Opening)
A · H = full length
6 · H = 3 1/2"
9 · J = 1/2"
Centre Front & Back
ZIP COLLAR PULL OVER
High Neck
PullOver
Sleeves
A · B = 8"
B · C = 1/12 of the Size
C · D = 3"
E · D = 1
A · F = Full length of Sleeves
F · G = 3/4 of R.B
BACK E
FRONT D
Folded Side
Sleeves
High Neck Pull Over
A · B = 1/12 Of the Size
A · C = 1/2" for back neck
A · D = 1" for front neck
ZIP COLLAR
Folded Side
A · B = 8"
A · D = 4"
D · E = 1/12 of the size
B · C = 2/3 of A D
D · C = 7"


ONE PIECE LADY COATS
SIZE 32.
HOSIERY GARMENTS
A
B
C
D
E
F
G
H
J
J
Centre Front & Back
Measurement of Front & Back
A . E = 28"
A . B
A . C } = 1/12 of the size
J . G = 1/4 of the size + 1"
G . H = 1/4 of the size.
K . G = 3"
D . E = 3 1/2
E . F


Hosiery Garments
DOUBLE BREAST
LADY COAT SIZE 36
Measurements of Front & Back
A · L . Full length i.e. 3/4 of the size
A · B } = 1/12 of the Size.
B · C }
B · D = 1/4 of the size
E · F = 3/4 of the Size
D · G = 1/4 of the Size.
D · H = 16"
H · J = 1"
J is the Center of H & K.
Measurements of Collar.
A · B = 8"
A · C = 4"
C · D = 1/12 of the Size.
A · E = 2/3 of B · F
Measurements of Sleeves
A · F = 22"
B · C = 1/12 of the Size
C · D = 3"
E · D = 1"
F · G = 3/4 of A B
G · H = 3"
Front Pieces
Center Back
Collar
Folded Side
Folded Side
FRONT PORTION

UNDERWEAR SIZE 36. HOSIERY GARMENTS



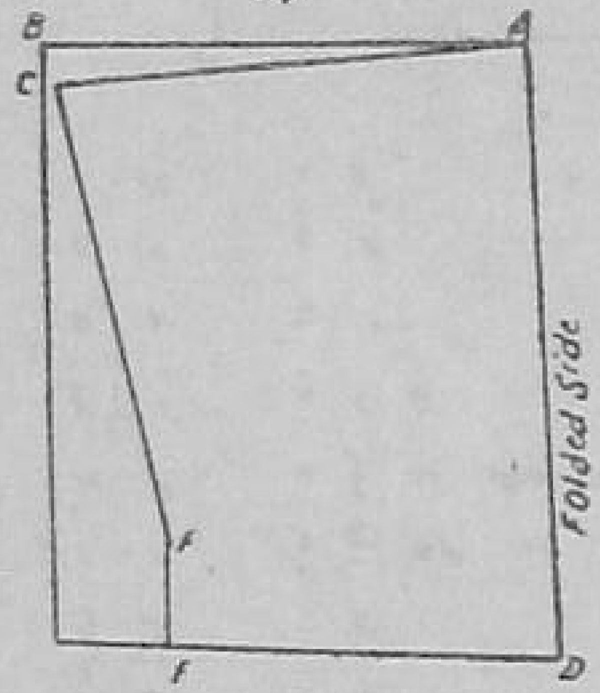
Round neck half Sleeves Vest.

Measurements of front & back.

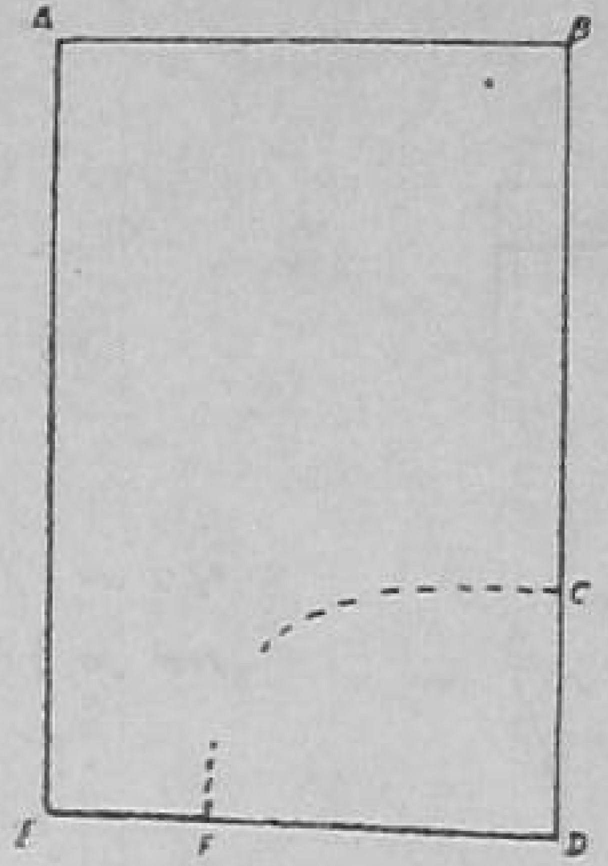
A . B = 1¾"
A . C = ¼"
A . G = 5½"
A . E = ¼ of the Size
D . E = 1"
E . F = ¼ of the Size.
H . J = DO
A . H = ¾ of the Size + 2"

Measurements of Sleeves

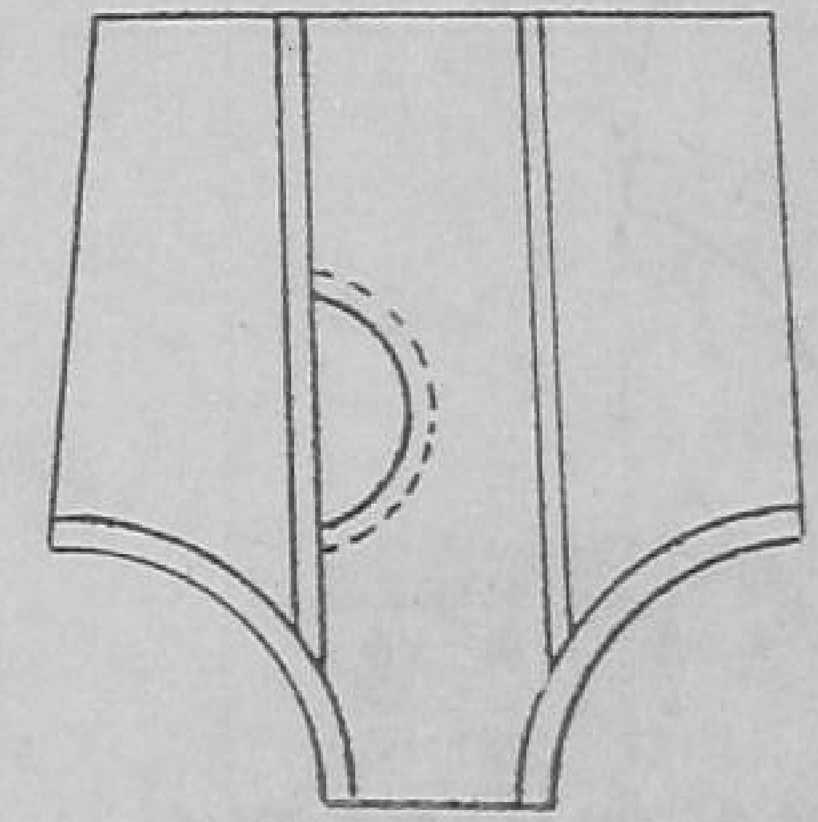
A . B = ¼ of the Size
B . C = 1"
A . D = ¼ of the Size + 1½"
D . E = ¾ of A . B.

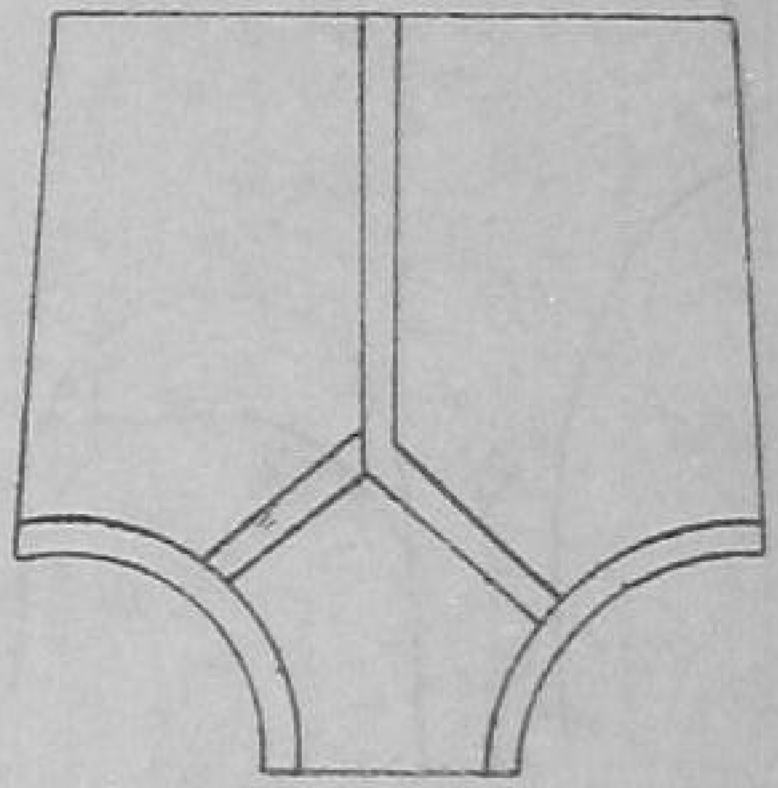


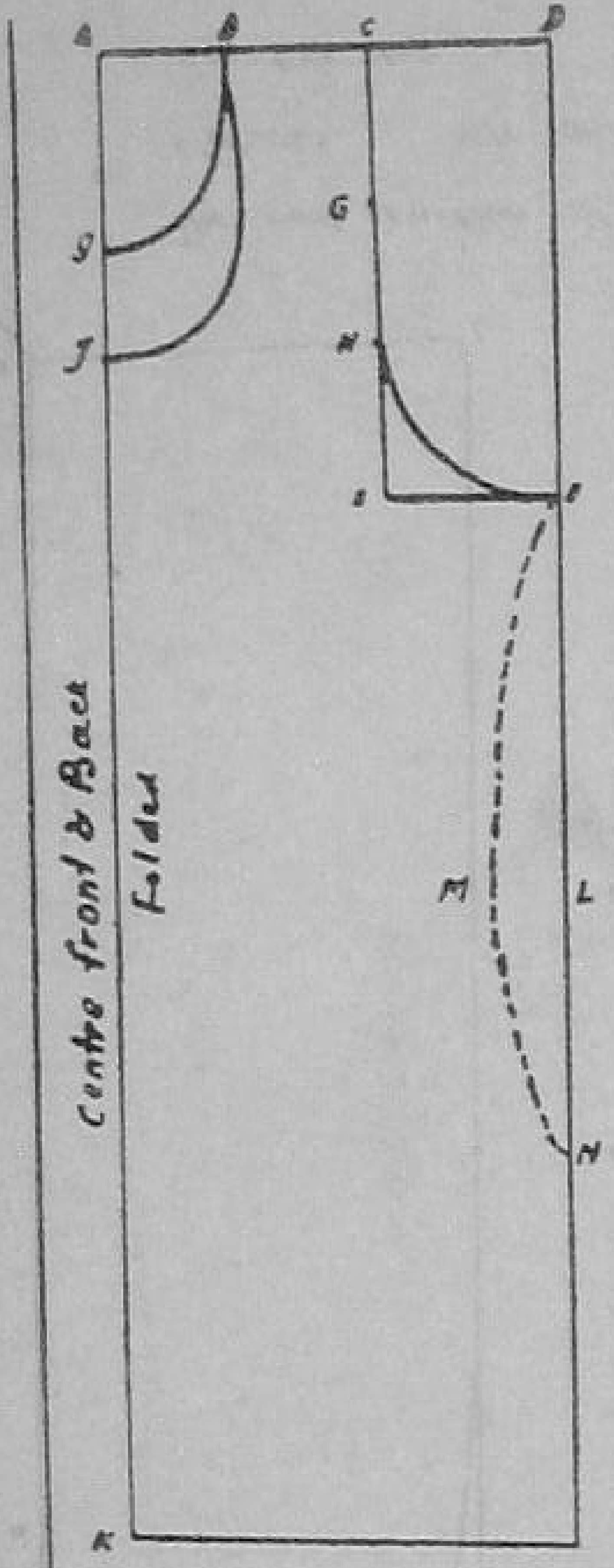
The neck portion of half Sleeves Vest is finished on flatlock m/c and the rest is stitched on three thread over lock m/c.



It is stitched on three thread over-lock m/c The top portion is finished with elastic

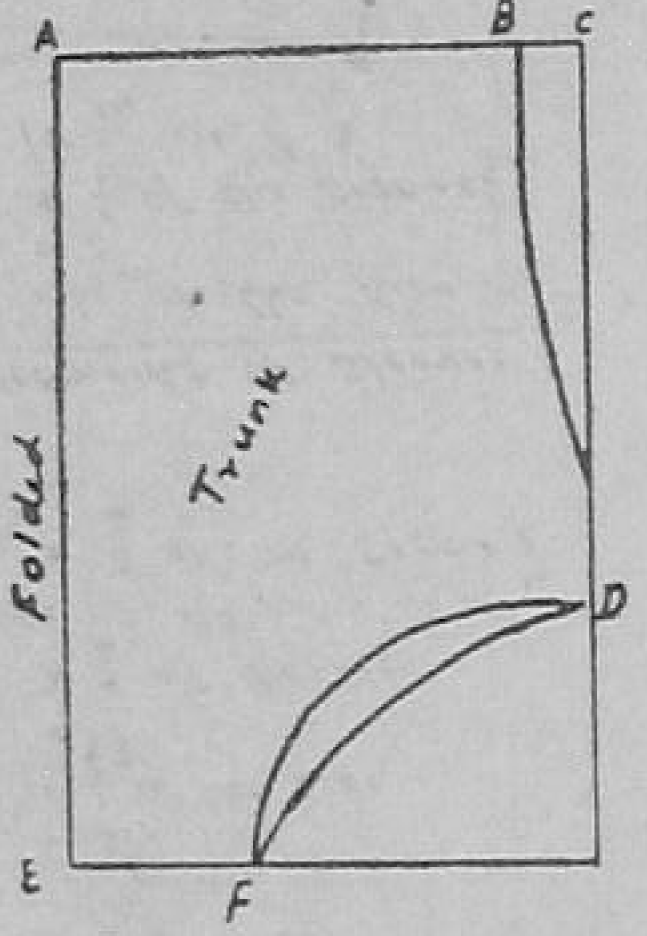






Measurements of Front & Back

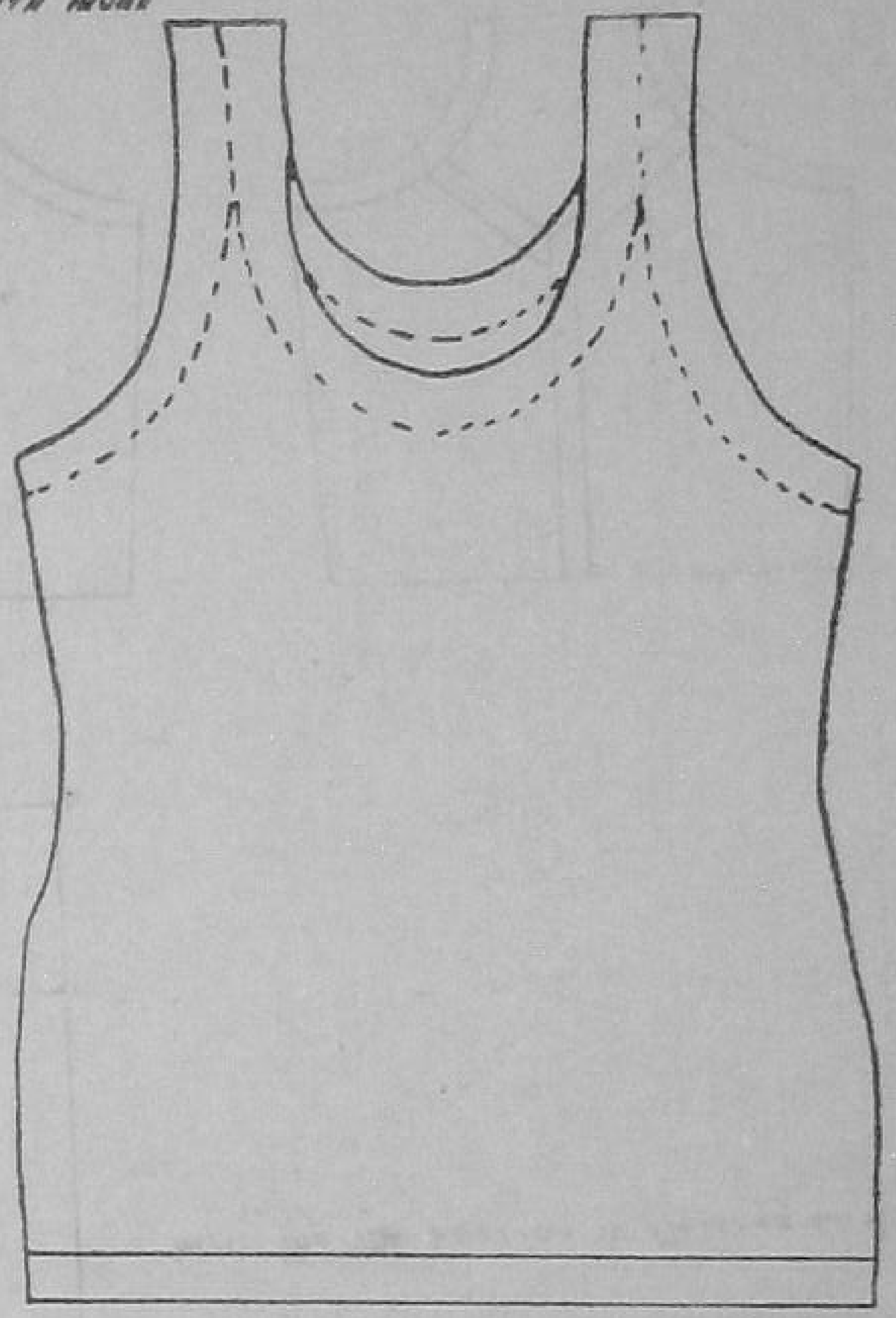
A · K = full size length ie $31\frac{1}{2}$
A · B = $2\frac{1}{2}''$
B · C = $8''$
A · D = $\frac{1}{4}$ of the size
A · g = $4''$
A · J = $6''$
C · F = $\frac{1}{4}$ of the size
H · F = $\frac{2}{3}$ of the C·F
E · F = C·D
D · L = $17''$
L · M = $2''$
L · N = $9''$



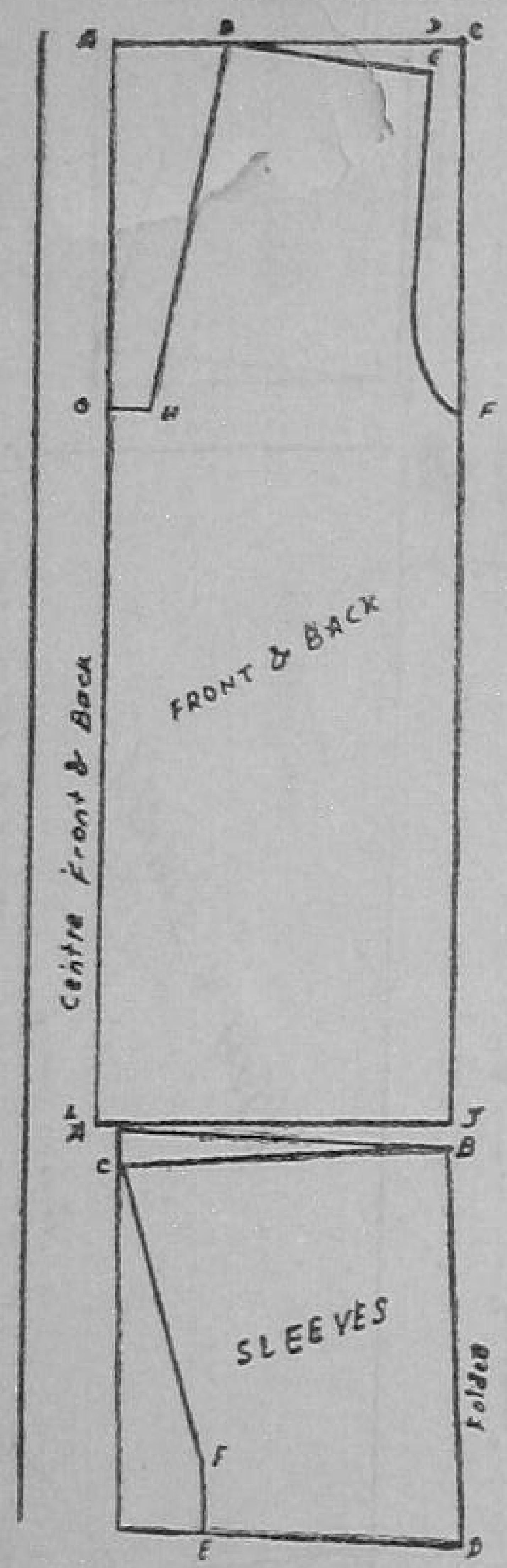
BATHING CASTUME WITH TRUNK
Size 36

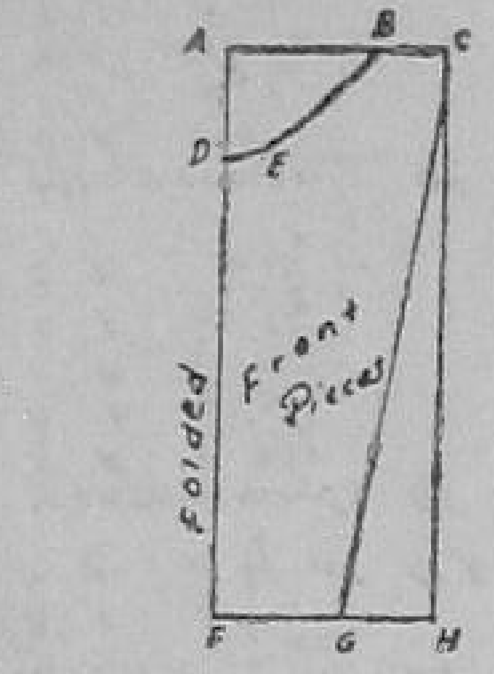
Measurements of Trunk

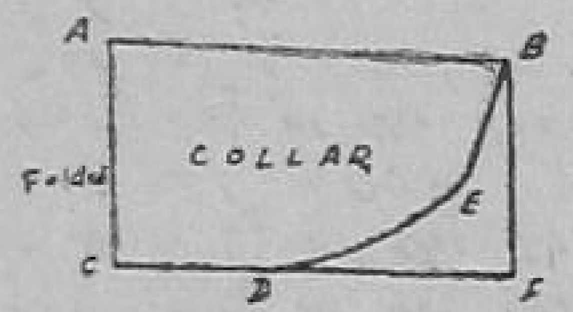
A · C = $\frac{1}{4}$ of Size
B · C = $1''$
A · E = $14''$
C · F = $\frac{2}{3}$ of A·E
E · F = $\frac{1}{12}$ of Size



COAT COLLAR SPORT SHIRT SIZE 36







Measurements of Front & Back

A.B = 1/12 of the size
D.C = 1"
D.E = 3/4
C.F = 1/4 of the size
AG = 1/4 of the size
G.H = 1
BL = 3/4 of the size + 3"
I.J & A.C = 1/4 of the size

Measurements of Front Pieces

A.C = 1/12 of the size + 1"
B.C = 1"
A.D = 2"
A.F = 1/4 of the size + 1"
F.G = 2½"
D.E = 1"

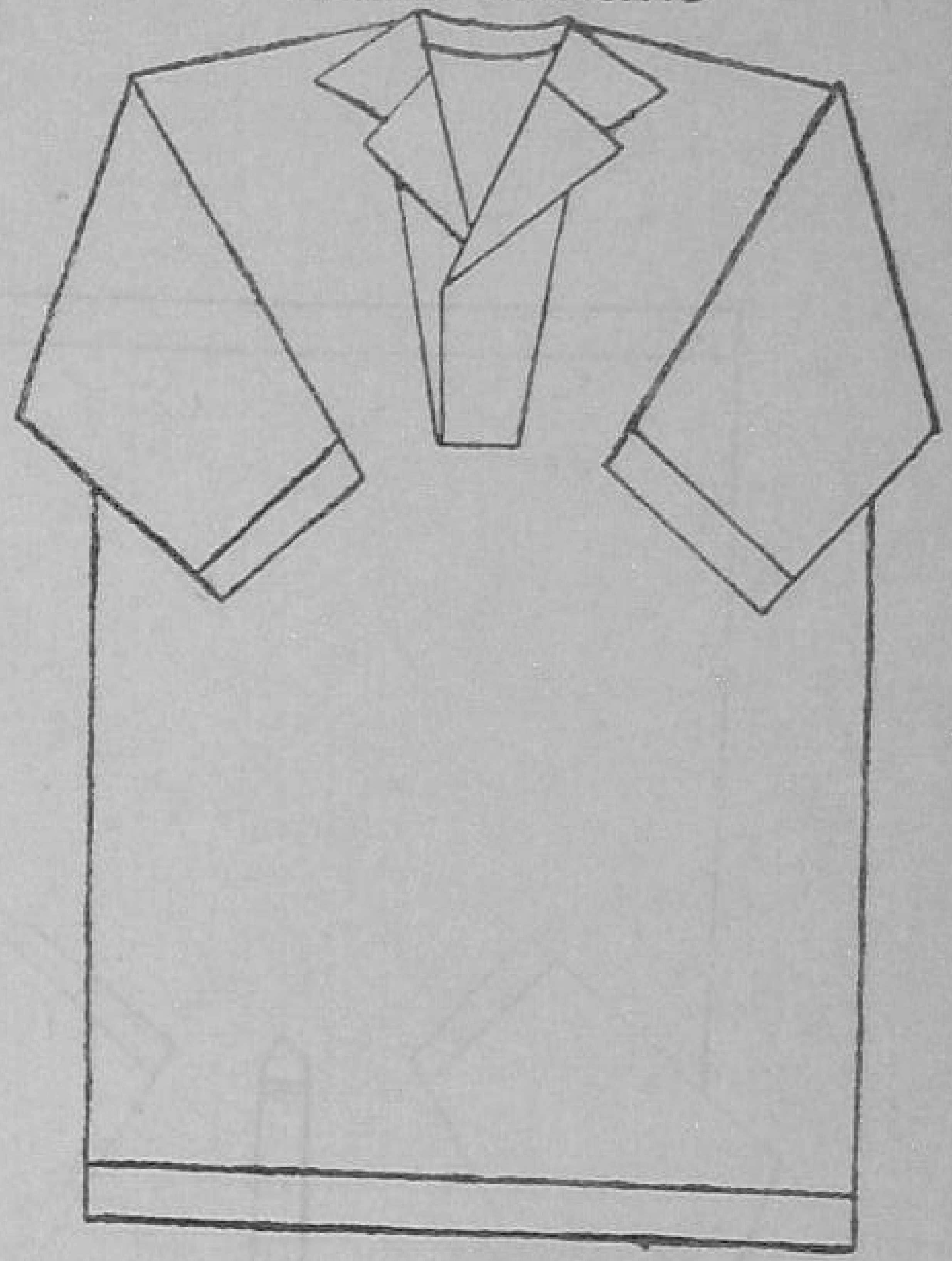
Measurents of Collar.

A.B = 7"
A.C = 4
C.D = 1/12 of the size
B.E = 3"

Measurements of Sleeves

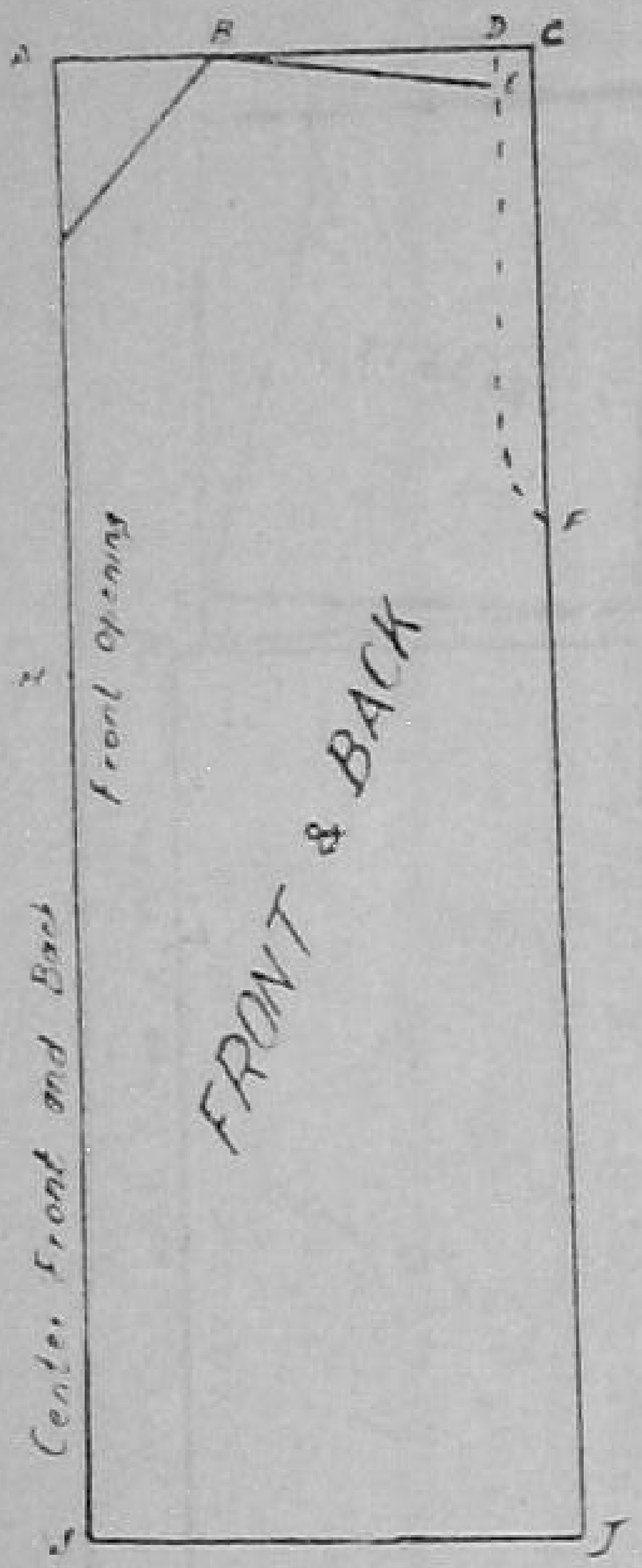
B.D = 1/4 of the size + 1½"
B.A = 1/4 of the size
A.C = 1"
D.E = 5/8 of B.A
E.F = 1½"

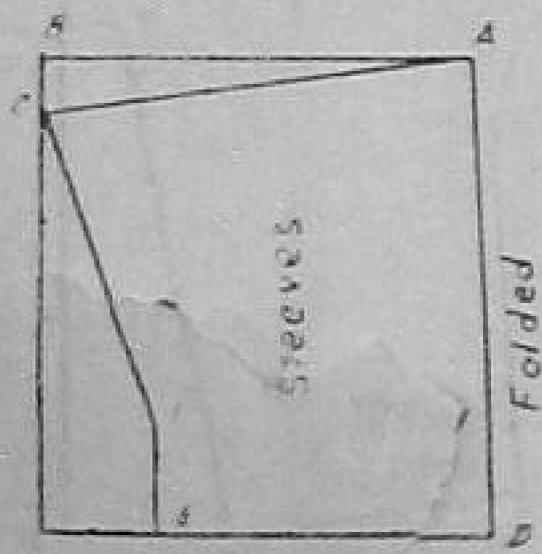
HOSIERY GARMENTS

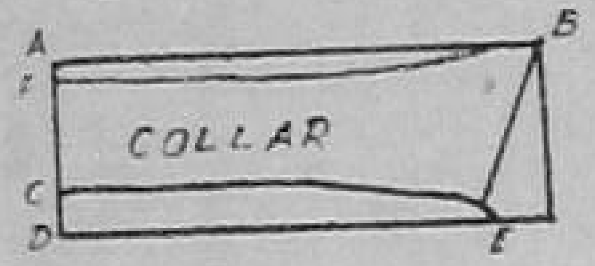


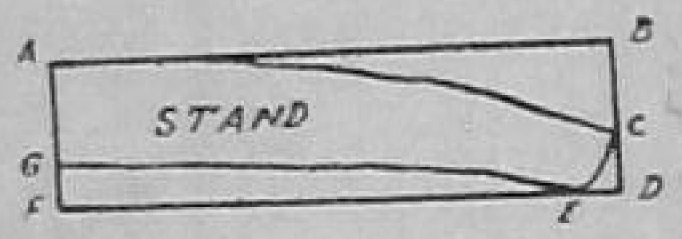
SIZE 36

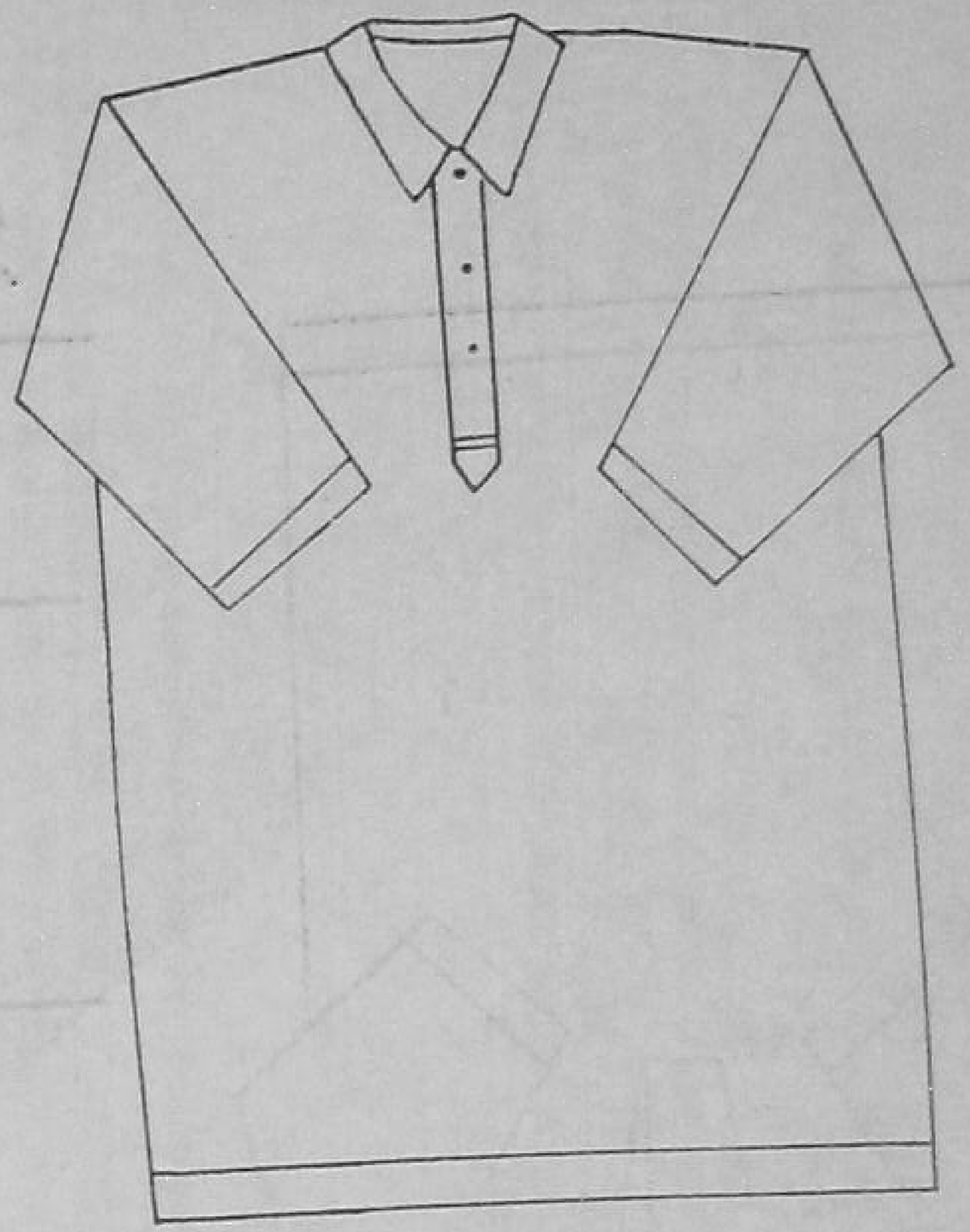
TIE COLLAR SPORT SHIRT











Measurements Of front & back.

A·J = 3/4 of the size + 2".
A·B = 1/12 of the size.
A·G = – DO –
G·H = 1/4 of the size.
D·C = 1"
D·E = 3/4
C·F = 1/4 of the size.

Measurements Of Sleeves.

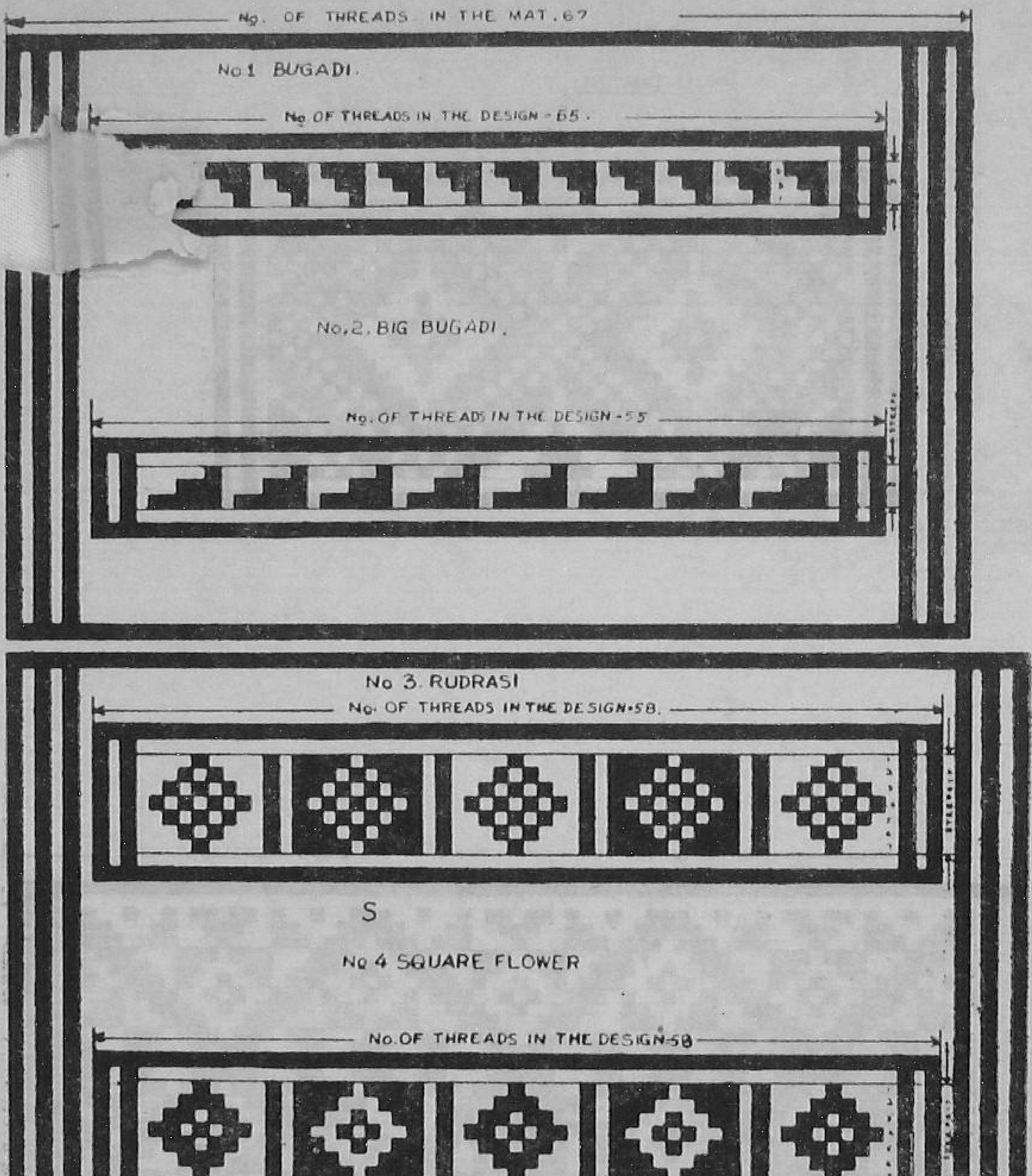
A·D = 1/4 of the size + 1½
A·B = 1/4 of the size.
B·C = 1"
D·E = 3/4 of A·B.

Measurements of Collar.

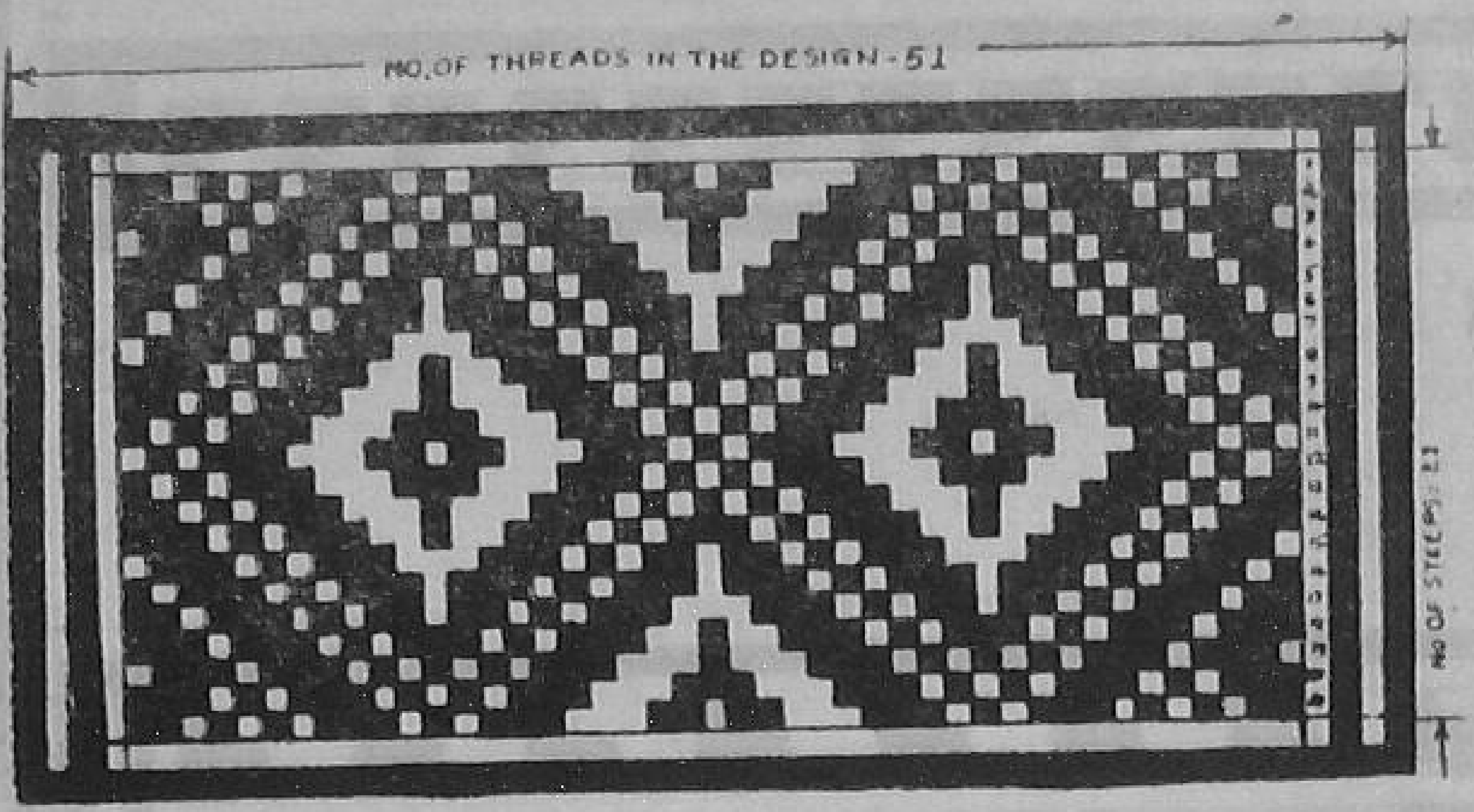
A·B = 8½
A·B = 3"
C·D = 1"
A·F = 1/8"
D·E = 7½"

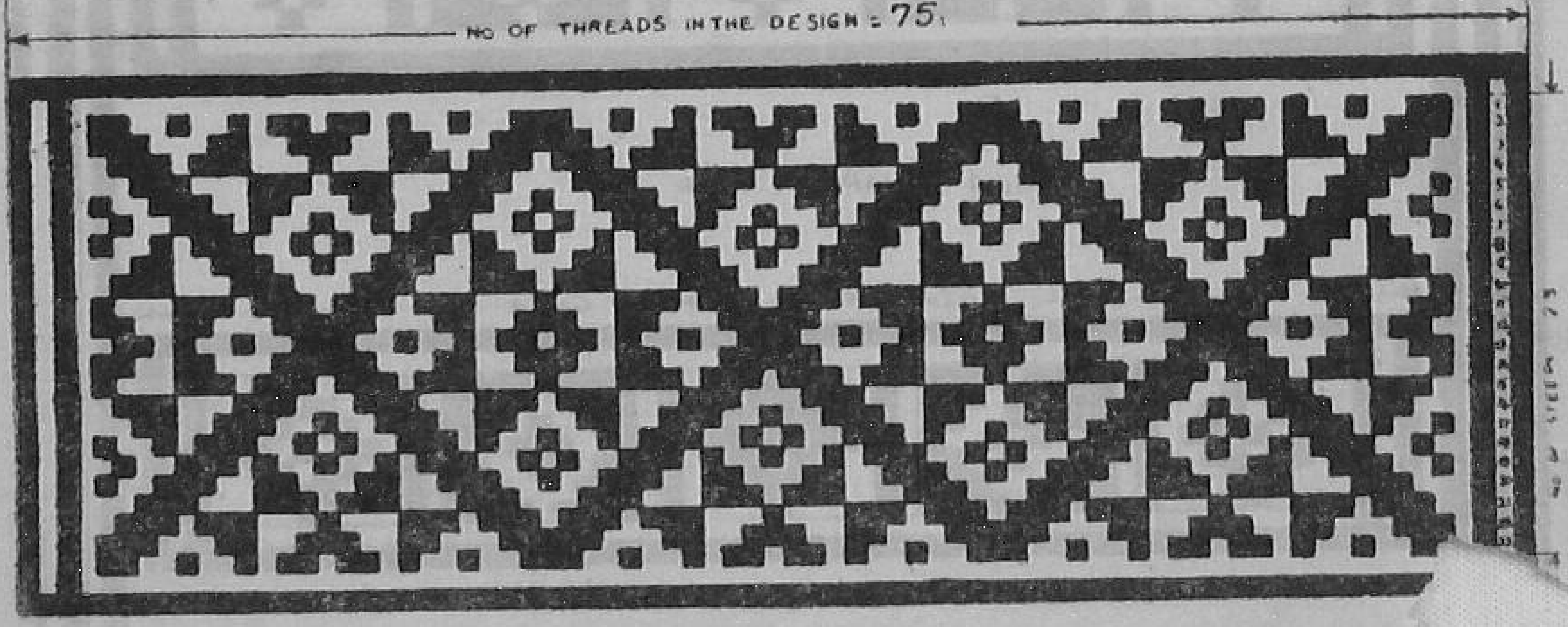
Measurements of stand.

A·B = 8½
A·F = 2½"
G·F = 1"
F·E = 7½"
D·C = 1¼"


No. OF THREADS IN THE MAT. 67
No 1 BUGADI.
No. OF THREADS IN THE DESIGN - 65.
No. 2. BIG BUGADI.
No. OF THREADS IN THE DESIGN - 55
No 3. RUDRASI
No. OF THREADS IN THE DESIGN - 58.
S
No 4 SQUARE FLOWER
No. OF THREADS IN THE DESIGN - 58
No. OF THREADS IN THE MAT. - 71

NO 5. DIMOND


NO. OF THREADS IN THE DESIGN - 51
NO OF STEEPS: 21


No OF THREADS IN THE DESIGN = 75.